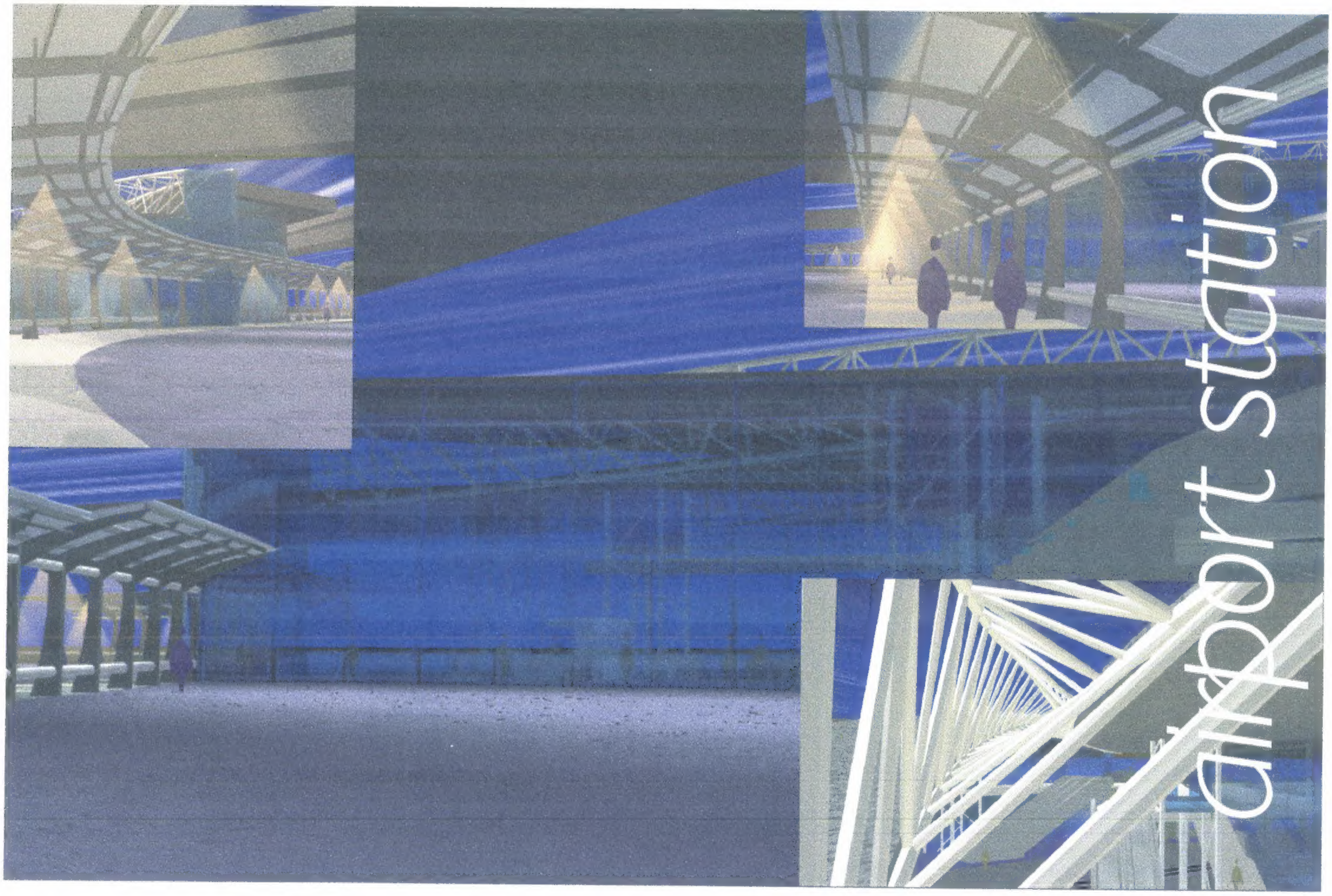
Conceptual
Design
Report

Massachusetts Bay Transportation Authority



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Architecture, Landscape architecture,
Planning, Urban Design

June 1, 1998

Conceptual Design Report: Airport Station MBTA Blue Line

Submitted to:

Massachusetts Bay Transportation Authority

Submitted by:

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Cost Estimating

June 1, 1998

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Executive Summary

As the Massachusetts Bay Transportation Authority's gateway for out of town passengers arriving via Logan Airport, Airport Station is one of the most important stations within the MBTA system. The Airport Station Project is part of the MBTA's Blue Line Modernization program. The new Airport Station will serve Massport's Airport Intermodal Transit Connector (AITC) buses connecting the MBTA's Blue Line to Logan Airport, rental car and hotel shuttle buses, and the Blue Line.

This Conceptual Design Report documents the design process and recommendations reached by the design team after an extended effort spanning the time between the initial Notice to Proceed in 1994 and the present.

Project Overview

The Airport Station Project commenced in 1994 as a comprehensive renovation of the existing station with new at-grade shuttle bus pickup and drop off. At that time the Central Artery/Tunnel (CA/T) Project had produced conceptual roadway and bus loop designs as part of the D008A contract in coordination with Massport and their Logan 2000 terminal roadway improvements. A proposed Automated People Mover system was also in planning as part of Logan 2000. Close coordination among these three major projects was anticipated.

The MBTA halted work on Airport Station after delays in the CA/T's work on D008A and reconsideration of the Automated People Mover project by Massport. In 1996 the CA/T determined that relocation of a section of the Blue Line track was required to accommodate changes in the Route 1A roadways. This work was incorporated into this Airport Station design contract.

Also in 1996, alternatives to maintaining the existing station were considered for the CA/T D008A contract. The Airport Station design team, at the request of the MBTA and the CA/T Project, assisted in a concerted effort to analyze potential design modifications to Wood Island Station to accommodate the Massport shuttle bus operations. A series of presentations to the East Boston community were held by the CA/T Project which resulted in substantial community opposition. Subsequently, a site was identified for a new station located between the existing Airport Station and Wood Island Station. Initial design meetings with the CA/T Project and the MBTA tested the feasibility of this site and the site proved feasible. As this new site presumes closure of the existing Airport Station, the scheme was presented to the East Boston community and the concept of a new relocated station was accepted.

Process Description/Recommendation

The design process of the past four years has required ongoing coordination of work on Airport Station with the CA/T D008A contract and Massport, as well as interfacing with the East Boston community under the CA/T's auspices.

Having settled on a site and direction for the project, a complete program for the new station was developed with input from key MBTA departmental personnel. Survey work and existing conditions investigations on site utilities and subsurface conditions have begun and will continue into Preliminary Design.

Utilizing MBTA station design criteria along with coordinated input from the CA/T

Project, Massport and the East Boston community, three conceptual design solutions were developed. These three schemes are documented in this report. After careful consideration on how best to meet the goals of the MBTA, the Airport Station passengers, the Massachusetts Highway Department, Massport and the East Boston community, it has been concluded that Scheme B (*see figure*) is the recommendation for further development in the Preliminary Design Phase.

Construction Cost Estimate

The estimate as to the probable cost of construction in escalated dollars is $26,746,000. Of that it is estimated that $12,784,000 can be attributed to the relocation to the new site, necessitated by the CA/T Project's roadway designs.

Schedule/Construction Contract

The Airport Station Project is now closely coupled with the CA/T D008A contract scheduling. Opening of the new Airport Station is a critical milestone for the CA/T Project on the D008A schedule, as demolition of the existing elevated bus loop cannot occur until the new station is on line. The current CA/T schedule requires the design team to complete final design on the new Airport Station by September 1999, and requires that the new station be in revenue service by December 2001.

At this time the construction contract for the new Airport Station is presumed to be a stand alone contract. The site for the new station is surrounded by new and existing roadway viaducts with little room for construction staging areas. Given this situation, it may be that as design develops consideration could be given to a combined construction contract with the D008A portion of the CA/T Project.

Next Steps

Following approval of this report by the MBTA, the design team will move into the Preliminary and Final Design Phases of the project, including both a community review process and a coordination process with the other agencies. Design is estimated to be completed in September 1999 and final construction in February 2002.

I. Project Background and Description

Airport Station is a key station within the Massachusetts Bay Transportation Authority (MBTA) system, as well as an important link in the metropolitan area's transportation system and a symbolic gateway between the City of Boston and Logan International Airport. The Airport Station Project is a major component of the MBTA's ongoing work to make significant transportation improvements to the Blue Line rapid transit system.

Airport Station serves riders from the adjacent East Boston neighborhoods coming from the vicinity of Bremen Street to the north and Porter Street to the west. The station also serves riders going to and from Logan Airport via airport shuttle buses operated by the Massachusetts Port Authority (Massport). It is projected that in the year 2010, approximately 80% of the riders using Airport Station will be airport-related, and approximately 20% will be community riders. For the purposes of the Airport Station Project, project north is the Bremen Street side of the Blue Line tracks, the tracks run outbound to Wonderland to the east and inbound to downtown Boston to the west, and the airport is to the south.

Under the Airport Station Project, a new station will be built approximately 500 feet to the east of the existing station. The new station site is a result of an interagency coordination process including the MBTA, the Central Artery/Tunnel (CA/T) project, and Massport. The site will accommodate Massport's existing bus service and proposed new airport intermodal transit connector (AITC) to Logan Airport, using roadways being designed and constructed by the CA/T Project.

The goals for this project include improved accessibility, improved community access and the accommodation of a greater number of airport shuttle buses with respect to the existing station; coordination with the CA/T roadway system; and the development of an attractive, safe and convenient station with high quality, durable and low-maintenance lighting, signage and finishes.

Project Background

A draft feasibility study for station improvements was completed by URS Consultants Inc. and CBT Inc. in August, 1989. That study assessed the feasibility of accommodating 6 to 8-car platforms, improving accessibility, and accommodating alterations to the roadway network resulting from the CA/T Project.

In 1993, the MBTA began a designer selection process, based on the 1989 feasibility study and the then current plans of the CA/T Project and Massport. The Central Artery/Tunnel Project Environmental Impact Statement (EIS) included modifications to Airport Station in the list of commitments to provide transit improvements as part of the CA/T Project. The EIS mentioned both improved access to the station for community residents and easier transfers for people with luggage transferring to and from the airport buses. At the time of the designer selection process, it was anticipated that Massport would institute an automated people mover system which would carry passengers from the MBTA station to the airline terminals, and that the station design would accommodate that system. Massport is now planning to institute the AITC in place of the people mover (see *II. Related Projects*). The station is being designed to accommodate the AITC. The Wallace Floyd team was selected in 1994 for the design of Airport Station, and was directed to undertake a Conceptual Design phase.

The Conceptual Design Phase was defined to address changes to the project since the 1989 Feasibility Study. These changes include a revised CA/T roadway alignment (see *II. Related Projects*) and the addition of Massport's proposed AITC. The revised busway will enable Massport to use existing vehicles, rather than requiring the purchase of new left-side loading shuttle buses, as was anticipated in the Feasibility Study. The ongoing design of the CA/T Project and the AITC will impact the design for Airport Station, and will continue to require a coordinated effort among the agencies and their respective consultants.

The primary goal of the Conceptual Design Phase has been to develop a recommended direction for the design of Airport Station which will accommodate the station program and criteria, will be coordinated with the current designs for the CA/T Project and the AITC, and will be feasible for phased construction and operation. This Conceptual Design Report documents the work completed and the recommended design for the station.

Siting History

The Wallace Floyd team's project startup work began in the spring of 1994, but was stopped due to delays in the CA/T Project. Station programming began for the second time in the fall of 1996, but was stopped again due to concerns regarding the station siting. These included concerns from the adjacent community regarding airport shuttle bus traffic in the vicinity of the neighborhood and parks, as well as issues with the proposed CA/T construction in the vicinity of the existing station.

In the fall of 1996, to address these concerns, at the request of the CA/T Project the MBTA directed the consultant team to study the possibility of modifying Wood Island Station (the next Blue Line station outbound from Airport Station) to accommodate the airport shuttle buses. The study also considered alternatives for the existing Airport Station to be modified to serve as a community station without the airport shuttle bus operation. A draft of this study was completed in the fall of 1997.

Due to concerns from the community regarding the proposed increased bus traffic at Wood Island Station, the CA/T Project then proposed a new station location approximately 500 feet east of the existing Airport Station. In October 1997, the MBTA requested that Wallace Floyd consider the implications of the new station location proposed by the CA/T Project. The team generated six alternative diagrams for the station circulation, based on a variety of bus loop configurations.

An interagency workshop was held to further consider the new station location. The purpose of the workshop was to develop a diagram to present to the community, and to be used to support the CA/T's Notice of Project Change (*submitted to the Massachusetts Environmental Protection Act Unit as part of the environmental review process*) for the new station location and other roadway changes. At this time, the CA/T requested that the station accommodate a pedestrian connection from Bremen Street through the new park being designed by the CA/T to the inbound side of the station.

The December workshop resulted in three alternative circulation diagrams for the station. Alternative 1 (based on vertical circulation perpendicular to the Blue Line tracks) was the MBTA's preferred diagram but took up too much space towards the bus loop. Alternative 3 (based on vertical circulation parallel to the Blue Line tracks) took up the least space towards the bus loop, but had several major circulation flaws.

Alternative 2 (based on vertical circulation diagonal to the Blue Line tracks) was

chosen by the agencies as a compromise which:

- provided a circulation diagram meeting the MBTA's minimum requirements
- minimized the required dimension between the Blue Line tracks and the bus loop
- minimized potential conflicts between the required station area and the CA/T viaducts
- alleviated the security concerns regarding the Bremen Street entrance.

The agencies agreed that the Alternative 2 envelope diagram at the new station location should be developed further. This alternative was presented to the community and received community concurrence. It was then incorporated into the CA/T's Notice of Project Change issued on 15 December 1997 and accepted by MEPA on 13 May 1998 (see Appendix F).

This alternative has formed the basis for the conceptual design schemes presented in this project.

II. Related Projects

A number of projects currently in various stages of planning and design by the MBTA and other public agencies are in close proximity to Airport Station and may affect the station design. Coordination with these projects will be ongoing throughout the subsequent Airport Station design and construction phases. These projects are summarized below. An interagency schedule showing design and construction schedules for the CA/T Project, the Blue Line Track Relocation Project, and Airport Station Project is attached as Appendix E.

Central Artery/Tunnel Project - D008A Contract

The Central Artery/Tunnel Project includes significant highway work in East Boston. D008A is the design contract for the portion of the CA/T Project in the vicinity of Airport Station. The construction of D008A will be done under several separate construction contracts, including demolition, temporary detours, and final construction.

The previously proposed new bus loop, which under the original CA/T design encircled the existing Airport Station adjacent to the west end of Memorial Stadium Park, has been eliminated. Airport Station will be relocated as previously described. Existing airport shuttle buses and future AITC buses will connect from the airport to the outbound side of the new Airport Station by using SR-2 (which will connect the Airport Surface Road to route 1A southbound and provide service connections around the airport) and SR-14 (which will connect the southwest service, north service and south cargo areas).

The CA/T Project has determined that it is not feasible to construct a bus loop to encircle the relocated Airport Station, providing cross-platform transfers in both directions. Such a design would require a crossing of the train tracks and grade changes that are not possible to achieve in the physical space within which the bus loop would need to be located. Instead, a busway will be built at grade on the outbound side of the station, approximately parallel to the Blue Line tracks. To mitigate the impact of the lack of crossplatform transfer in the inbound direction, the pedestrian circulation route through the station over the Blue Line tracks will be as direct as possible.

The CA/T Project includes changes to airport surface roads to provide an optimal interface between the CA/T Project and Massport's terminal area and infrastructure modernization plan, known as *Logan 2000*. The CA/T Project also requires the relocation of a portion of the Blue Line tracks, being performed under a separate design and construction effort by the MBTA.

See Appendices E, F, and G for additional information on the CA/T project.

Airport Intermodal Transit Connector

The AITC, being planned by Massport, will provide a transit alternative for air passengers and other users of Logan Airport. It will consist of two routes to connect the airport with other public transportation. One of the two AITC routes is a new link between the airport and the MBTA Red Line, commuter rail, and intercity rail (Amtrak) at South Station. The second route will be an upgrade of the existing connection between the airport and the MBTA Blue Line at Airport Station.

The AITC capitalizes on existing or planned roadways to establish the two-route bus system. It will use transportation infrastructure available in 2002, including airport roadways, the Ted Williams Tunnel, the South Boston Piers Transitway (a bus tunnel between the World Trade Center and South Station), and roadways in the South Boston Seaport District. AITC vehicles will be low-platform buses for easy passenger entry and exit, with compressed natural gas (CNG) and dual-mode propulsion technology to reduce environmental impacts, and other advanced technology features to improve system reliability and passenger comfort. The AITC is expected to meet future airport ground transportation needs until air passenger levels reach 37.5 million annual passengers.

Blue Line Track Relocation

In order to accommodate the design of the CA/T Project's new roadways, the existing Blue Line tracks must be realigned. At the request of the CA/T Project, the MBTA added the Blue Line Track Relocation Project to the scope of the Airport Station design team. The Blue Line Track Relocation Project includes the realignment of the tracks from the existing Airport Station to the Prescott Street underpass, the extension of third rail power to the location of the new station platforms, the provision of catenary power from the new Airport Station to the Prescott Street portal along the new alignment, and the addition of two new track crossovers in the vicinity of the proposed Airport Station. The Scope of Services for the track relocation includes as much as possible of the track, power and signal work required by the CA/T's request to move Airport Station. However, some of this work must be performed during the design of the station. The Blue Line Track Relocation Project began design of the current alignment in April 1998, and design is planned to be completed in January 1999. Construction is estimated to be completed in November 2000.

The Urban Ring

This proposed transit project would provide circumferential transit connections outside of Boston's urban core, including a proposed stop at the new Airport Station. The Airport Station project does not preclude the future development of the Urban Ring, but no specific accommodations for Urban Ring connections/service have been made in the design to date. The MBTA Planning Department and Massport have been discussing the shared use of the proposed 10 bus bays at the new station location.

III. Existing Conditions

Existing Station

The existing station was opened in 1952 and most recently renovated in 1966. It is located in East Boston between Maverick and Wood Island Stations at the Route 1A interchange with the Logan Airport Service Roads. The station platforms are 300 feet long and can accommodate six-car trains. An existing MBTA traction power substation is located northeast of the outbound platform. The station is not fully accessible.

Access from the Porter Street neighborhood is provided at the southwest end of the station. Passengers entering the station at this point must climb a stairway to the upper level, pass through fare collection and then descend to platform levels. An exit to Porter Street is also provided at platform level via a walkway parallel to the tracks. Pedestrians from the Bremen Street area must use Porter Street or cross under the Route 1A roadways and over the Blue Line tunnel on an undefined, unlighted pathway.

The station is served by Massport buses at the upper level via an elevated busway. These buses pick up subway passengers for distribution to the five airline terminals and other Massport service facilities and discharge return passengers. Passengers traveling on the Blue Line to the airport must use an escalator or walk up a flight of stairs from the outbound platform, or up stairs only from the inbound platform, to the bus stop area, while passengers from the airport to the Blue Line enter fare collection at the upper level and descend via stairs to the inbound or outbound platform.

New Station Site

The new station site is located 500 feet east of the existing station, south of the Bremen Street buffer park being constructed as part of the CA/T project. The parcel is circumscribed by several new CA/T viaducts, the new busway being designed by the CA/T for the Massport buses, and the realigned Blue Line tracks. To the west is the existing MBTA traction power substation. The site is extremely constrained on all sides as well as above by the limited vertical clearance available under the viaducts. The limits of the Airport Station Project are understood at this time to be the face of the building on the north, the edge of the busway curb on the south, the existing MBTA traction power substation on the west, and the edge of the station service plaza at the surface road/ busway on the east.

Under the Blue Line Track Relocation Project (see *II. Related Projects*) the Blue Line tracks within the limit of work for Airport Station are presently scheduled to be relocated prior to construction of the building. The station will be located along a section of tangent track shifted slightly to the north of its present location. An existing highway viaduct currently located in the area will be relocated outside the proposed Airport Station limit of work by the CA/T Project prior to construction on the Blue Line Track Relocation Project. Additional relocation work, such as utility relocations, may be required prior to the start of station construction. Extensive coordination of design and construction phasing will be required among the CA/T, Blue Line, and Airport Station projects.

The station will be served by pedestrian entrances on both the inbound and outbound sides of the station, to connect to the East Boston neighborhoods. Pedestrian access

from the north will come through the new Bremen Street Park, across from Brook Street, being designed and constructed by the CA/T project; pedestrian access from the west will come through the upgraded Memorial Stadium Park. The Memorial Stadium Park will be linked to the station by a paved and landscaped plaza to the west of the station. The plaza will include pedestrian scaled site lighting, and seating for pedestrians and airport passengers waiting for buses.

Airport shuttle buses will drop-off and pick-up passengers on a busway on the south (outbound) side of the station. A total length of 550 feet of curb space is being designed by the CA/T Project. This will be divided into passenger drop-off at the eastern half and pick-up at the western half. Massport anticipates allocating ten bus bays at 55 feet each. These bays will accommodate airport shuttle buses, rental car and hotel shuttle buses, and the future AITC vehicles.

Passenger access to the station from the East Boston neighborhoods and from the busway will be along fully accessible routes.

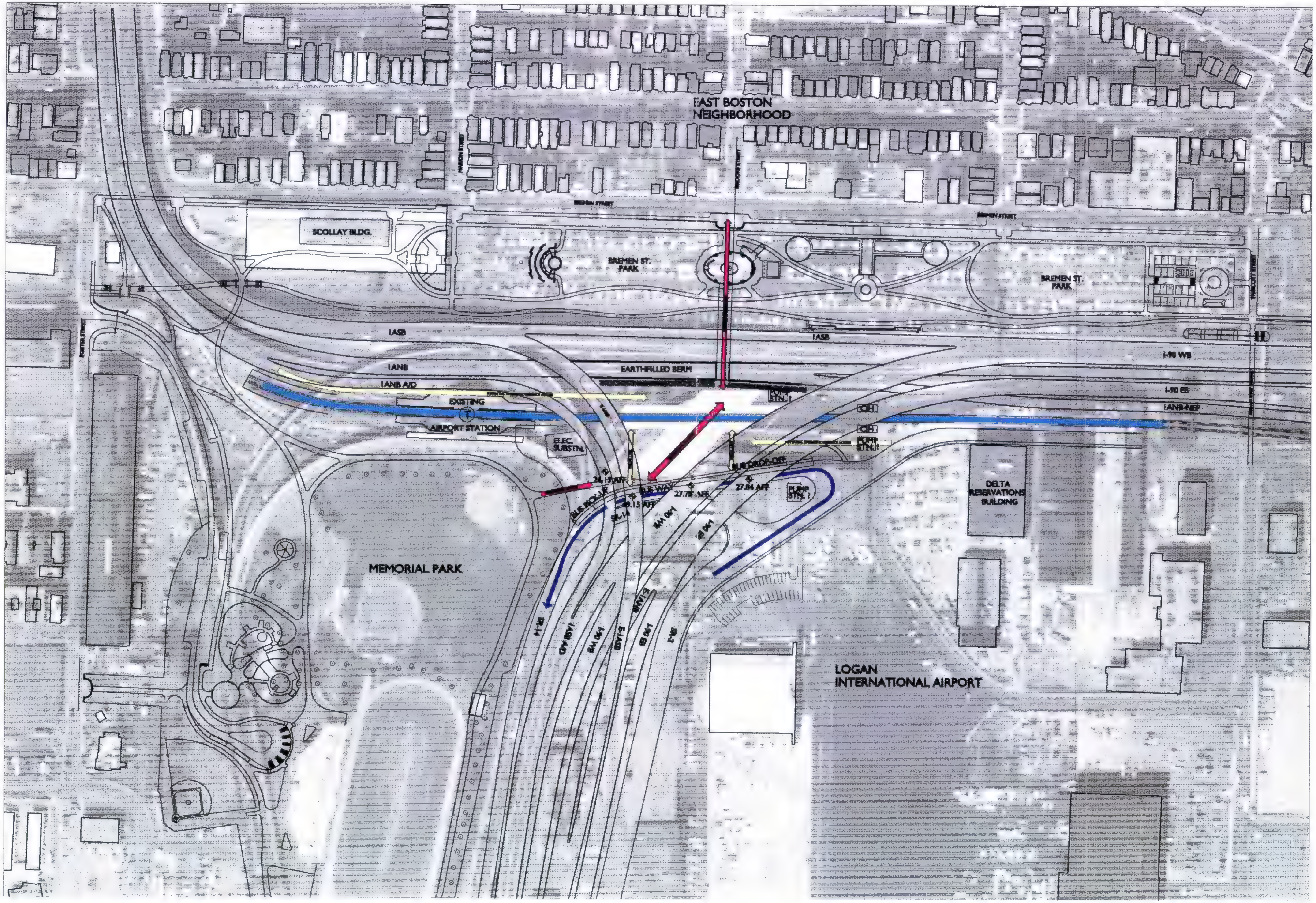
The Blue Line tracks at the new station location will be at grade, and the station platforms will be approximately 3 feet above grade in order to provide level boarding onto the Blue Line cars. The raised platform level will be continued through the new station lobby on the outbound side and out to the adjacent bus platform and pedestrian plaza. The plaza and bus platform will be graded down at a maximum 2% accessible slope to meet surrounding grades to the east and west. The landscaped portion of the west plaza will be terraced as required to contain site drainage away from the existing MBTA electrical substation.

On the inbound side of the station the available site area outside the station entrance from the Bremen Street Park is too restricted to make the grade change from the surrounding grades up to the platform level. The inbound station entrance will therefore be at grade, and an accessible route up to the platform level will be provided within the station, using a ramp and stair.

Service and emergency vehicle access to the station will be provided on both sides of the Blue Line tracks. Access to the primary station entrance on the outbound side for regular MBTA service and maintenance and for public emergency vehicle access will be from Neptune Road onto the service road (SR2) or the busway onto the service plaza east of the station. Parking will be provided on the plaza for three to four MBTA vehicles.

Access to the secondary entrance on the inbound side of the station for occasional MBTA maintenance and for public emergency vehicles will be via a grass paver roadway accessed from Porter Street, to be built by the CA/T Project along the north side of the Blue Line tracks.

Regular weekly vehicle access is required to the existing MBTA traction power substation to the west of the new station. The required canopy at the new busway curb will prevent vehicle access onto the west plaza directly from the bus bays. Two other alternative routes for substation vehicle access are shown in this report. One alternative is for MBTA vehicles to access the substation from the west by using the Memorial Stadium Park pathway from Porter Street through the new park, through gates in the new park fence to a paved driveway at the substation. A second alternative is to bring MBTA vehicles to the substation from the south via a driveway off the busway to the west of the end bus bay and the end of the canopy. Both alternatives have potential park impacts and will require review and coordination with the MBTA, the CA/T Project and the community.



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Airport Station
MBTA
East Boston, MA

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Architecture
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Architectural Subconsultant

Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

Project North
North

Site Conditions

No.	Date	Revision

Job No. 14103
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Date: 29 MAY 1998
Scale: 1"=200'
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IV. Conceptual Design

Architectural Design

Airport Station is a key station in the MBTA system which must provide a high level of patron service for community riders as well as airport riders. Pedestrian and vehicular circulation will be coordinated to assure functional, attractive, and safe access to the station. The fully accessible station will ease travel for the disabled as well as for passengers with luggage. The station architecture and structural system will work together to express the building's role as a gateway station and major transportation hub. Lighting and graphics will be integrated within the station architecture to provide information and orientation for passengers, as well as to enhance the sense of safety and comfort. A program for independent selection of artists using the MBTA's established process will be undertaken to develop artwork for the new station.

Site constraints and circulation requirements of the station establish to a great degree the disposition of the plan for each of the three schemes which were developed in the Conceptual Design phase. The site constraints include pedestrian and vehicle connections to the station, the Blue Line track alignment, and the surrounding CA/T roadways. The layout of the station should address a connection to Massport's shuttle buses, community access through Memorial Park on the outbound side of the station and community access through Bremen Street Park on the inbound side of the station. The CA/T viaducts are constraints in both the station siting and massing volume. To the extent possible, the new station should remain clear from under the proposed CA/T viaducts on the east and west sides of the site.

The major circulation requirement of the station is for passengers to move from the entrance lobby through fare collection to the platform, and vice versa. There will be a large number of first-time out of town travelers using the station, as well as a large number of passengers carrying luggage. Therefore the pedestrian circulation route must be as clear and direct as possible.

Approximately 80% of the passengers entering the station will be coming from the airport shuttle buses, and the majority of these passengers will be going inbound to downtown Boston. In the reverse direction, the majority of passengers exiting the station will be going from the outbound platform to the shuttle buses. These two major travel paths are key determinants of the layout of all three schemes.

The station site is constrained by the very limited dimension available between the Blue Line track realignment and the new busway. This limited dimension has resulted in a station internal circulation route which is skewed relative to the tracks and platforms. This skewed circulation also links the primary and secondary entrances to the station, creating a sense of clarity and security for community and Logan passengers.

Three alternative schemes have been developed in this Conceptual Design phase. Each scheme addresses the issues identified above while providing differing architectural solutions. The major elements common to all schemes are as follows:

- Primary station entrance on the outbound side with two fare collection booths to handle overflow periods, token/change machines, and a large number of turnstiles with capacity for luggage to accommodate average peak loads. Primary entrance lobby is open and welcoming, with multiple entry doorways for ease of flow; and flight monitors for Logan-bound passengers.

- Secondary station entrance from Bremen Street Park on the inbound side will be unsupervised and will utilize token/change machines and high entrance rotary gates; entrance on axis with park path and Brook Street.
- A two-story station concourse over the Blue Line tracks connecting the two entries with the platforms via a linear circulation path for clarity and ease of movement.
- Fully covered 300 foot long train platforms to accommodate future six-car Blue Line trains; trainway open above or covered with skylight; platforms offset to the west per CA/T Project request to remain clear of the CA/T Project's I-90 westbound viaduct.
- Fully covered 550 foot long platform for Massport shuttle buses with a covered connection to primary station entrance.
- Clear visual connection between train platforms and bus platform for passenger orientation.
- Oversized vertical circulation to accommodate peak flows and passengers with luggage; on each side of the tracks the circulation will include a large elevator with a cab approximately 8' x 10', two heavy duty transit escalators and a generous public stair.
- Attractive, durable materials affording lower life cycle costs and minimizing maintenance.

Scheme A

The passenger circulation path from the busway to the inbound platform establishes the plan for the building in Scheme A. The building form rises wave-like from the busway to the Blue Line tracks to accommodate the paid and unpaid pedestrian crossovers and addresses the Bremen Street Park axis. The face of the building volume is skewed to align with this axis and to create a prominent frontal facade to the park, providing a beacon to East Boston commuters approaching from the north. Two flanking volumes on the sides of the entry lobby house some of the program support spaces and serve to reinforce the fluid character of the building form.

Passengers traveling from the Massport shuttle buses to Boston arrive at the designated bus berths, which are the first five bus bays to the east. Passengers proceed under the full length bus canopy to the station entrance. In order to provide direct access from the busway to the station lobby, this scheme provides entry doors along the east side of the lobby. The lobby is open with fare collection located along the full width of the path of travel. Passengers pass through the fare collection point to vertical circulation, over the tracks to the inbound platform.

Blue Line passengers arriving from Boston will disembark on the outbound platform, and exit through fare collection to the lobby/waiting area where flight monitors and information resource facilities will be located. The designated passenger pick-up berths are the five westerly bays. Passengers will proceed through the lobby doors to a covered canopy connection to these bays.

Scheme A provides an unpaid crossover internal to the station, from the Bremen Street Park through the station to the primary entrance lobby, allowing pedestrians to cross the Blue Line tracks without passing through fare collection. This accessible crossover is located directly above the paid crossover with access to stairs and elevator at either side.

As route 1A northbound rises to allow for the at-grade pedestrian connection on the inbound side of the station, it creates a vertical face along the north of the site. Support spaces are located on this side of the station to visually separate the inbound platform

from this condition, while keeping the outbound platform clear to allow a visual connection to the bus platform.

Scheme B

The building form of Scheme B also reflects and responds to the primary circulation movements within the station but takes further cues from the unusual site within which the station is located. The organization of the plan separates the flow of inbound and outbound passengers, expediting passage through the station while enhancing the clarity of pedestrian movements. Similarly, the form of the building responds directly to the external conditions defined by the new 1A/I-90 viaducts, creating a sense that the building belongs quite specifically to this site and represents an enhancement of, not a confrontation to, its surroundings.

Passenger circulation in Scheme B differs from Scheme A in that the vertical circulation for the paid crossover is located to the east side of the building, while circulation for the unpaid crossover is on the west side of the building. This reinforces the building form and serves to further define passenger flow through the station. Paid passengers entering the primary entrance lobby will pass through fare collection and move directly to the vertical circulation without crossing exiting passenger traffic. The pedestrian interested in using the unpaid crossover to connect across the Blue Line tracks will enter the unpaid lobby from Bremen Street Park and use the same elevator as the paid passenger. The elevator will be electronically controlled so only the unpaid crossover door opens above. In an effort to maintain a fully separated circulation diagram, this scheme requires the addition of a third elevator, located on the outbound side. This elevator need not be as large as the two primary elevators serving passengers with luggage.

The curved facade seen at the primary entrance lobby provides an improved resolution to complicated geometries which converge at the station entry. Pedestrian traffic will enter and exit from a number of directions, all of which can be addressed along the gently curving facade. The lobby itself is open, without obstructions. Support spaces are located on the inbound side of the station, thus maximizing the potential for visual connections between the train and bus platforms on the outbound side of the station.

Scheme C

The two previous schemes recognize the conflicting and somewhat chaotic nature of the site geometries and represent attempts to meld the building with the site conditions. A different conceptual approach to these conditions is to create a simple structure as a counterpoint to a very busy environment. This is the design approach for Scheme C. The massing of the building does not relate to the viaducts, but imposes a centralized, assertive architecture to create clarity and a formal order on the site.

To that end, the organization of Scheme C follows a simple, orthogonal structural grid. The building has one large volume, square in plan, at the primary lobby which houses the fare collection area and vertical circulation. A circular form is inscribed within this volume which allows the busway facade of the building to accommodate pedestrian traffic flows from any direction. The inbound side of the station still houses the support areas, again in a simple rectangle. The very east end of this rectangle will include the Bremen Street Park entrance and lobby.

Due to the site constraints, if the primary circulation from the busway to the inbound platform is to remain linear, it must remain on the skewed angle as in previous schemes. The paid crossover lands near the Bremen Street lobby, but the visual and psychological connection of this lobby to the primary lobby is much weaker than in the previous schemes, which will cause this lobby to feel disconnected. No unpaid crossover was developed for this scheme.

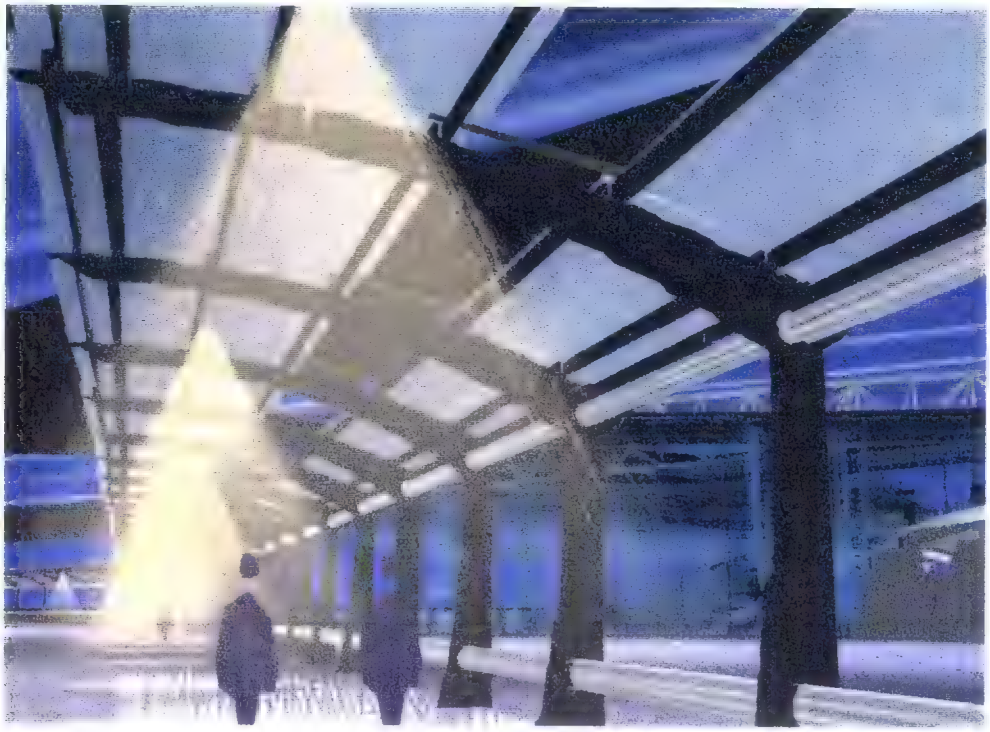
Recommended Scheme

It is felt that Scheme B is the most appropriate option for the MBTA's new Airport Station for the following reasons:

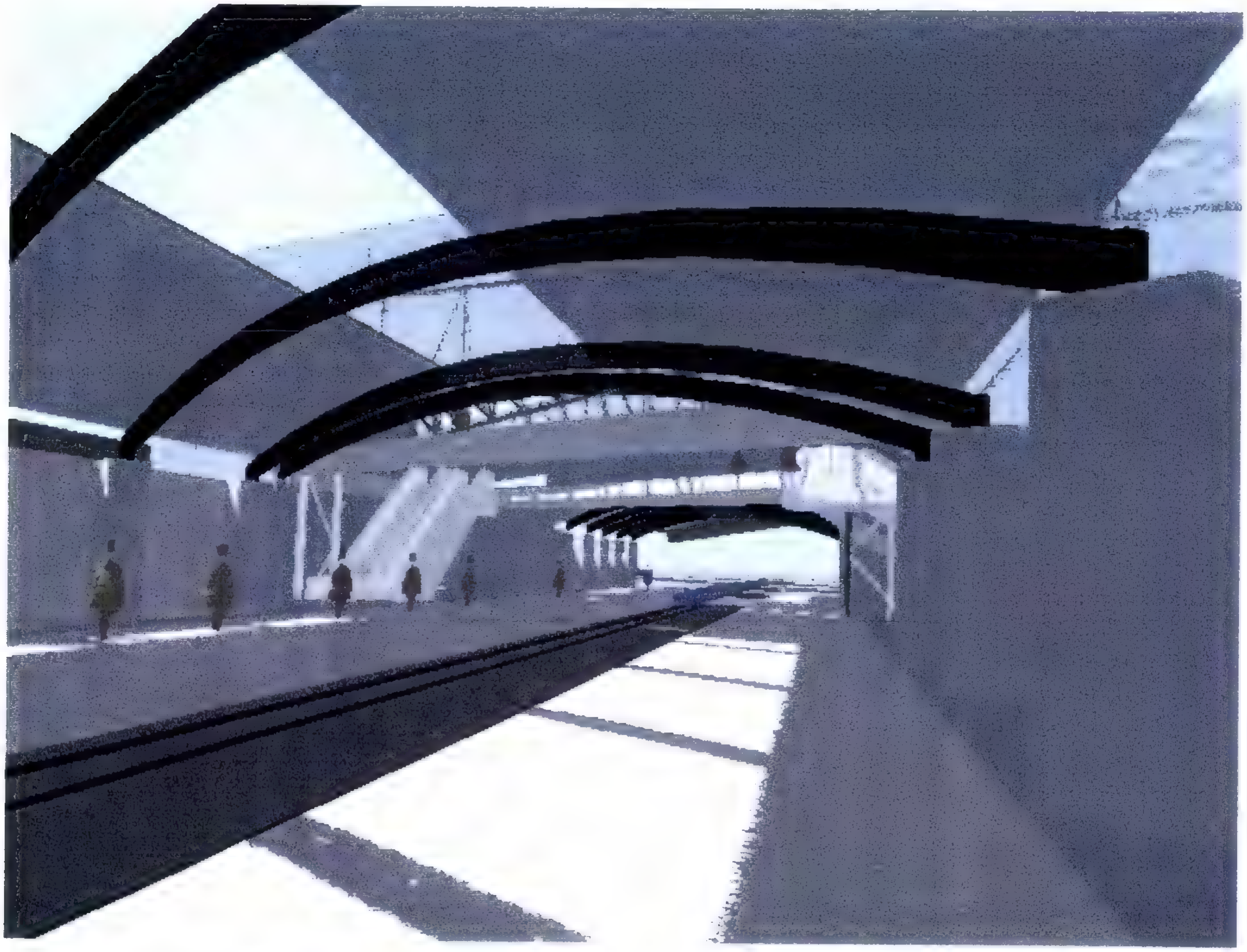
Circulation: The design of public transit stations, particularly one as busy as Airport Station with many of its passengers unfamiliar with the station or with the MBTA system, must be clear and readily understandable. The architecture of the station, to the degree possible, must provide strong orientation to the visitor. Of the options studied, the direct correlation of the massing and volumes of Scheme B with the pedestrian movements within the building, one volume relating to the movement of passengers leaving the outbound Blue Line train (further reinforced by the unpaid crossover overhead) and the other relating to the flow of passengers going to the inbound platform, sets this scheme apart from the other two options developed. This directional cueing is reinforced by a skylight which forms a seam between the two masses. The architecture to support pedestrian circulation is not as strong in either Scheme A or C. Schemes A and C both create crossing pedestrian traffic patterns which would not expedite pedestrian flow as well as Scheme B.

Form/Context: The selected site for the station is challenging and unique. The triangular shape, bounded by four overhead highway viaducts on two sides and an at-grade highway on the third, with odd angles at the various connection points all contribute to an extremely demanding environment. The architecture of the station could choose to combat or even ignore the unusual setting, but this strategy would most likely fail, creating a building that felt woefully misplaced. The overpowering nature of the surrounding environment would render any building that ignored or fought the surroundings odd, at best. The nature of an airport station itself, no matter where its location, demands that it be a key station, a 'gateway to the City of Boston'. Of the three schemes studied, the sweeping form and curved geometries of Scheme B actually enhances the site as a whole, responding in kind to the geometries of the viaducts, making the total situation a coherent, intelligible environment. The station feels more comfortable in its site than schemes A and C.

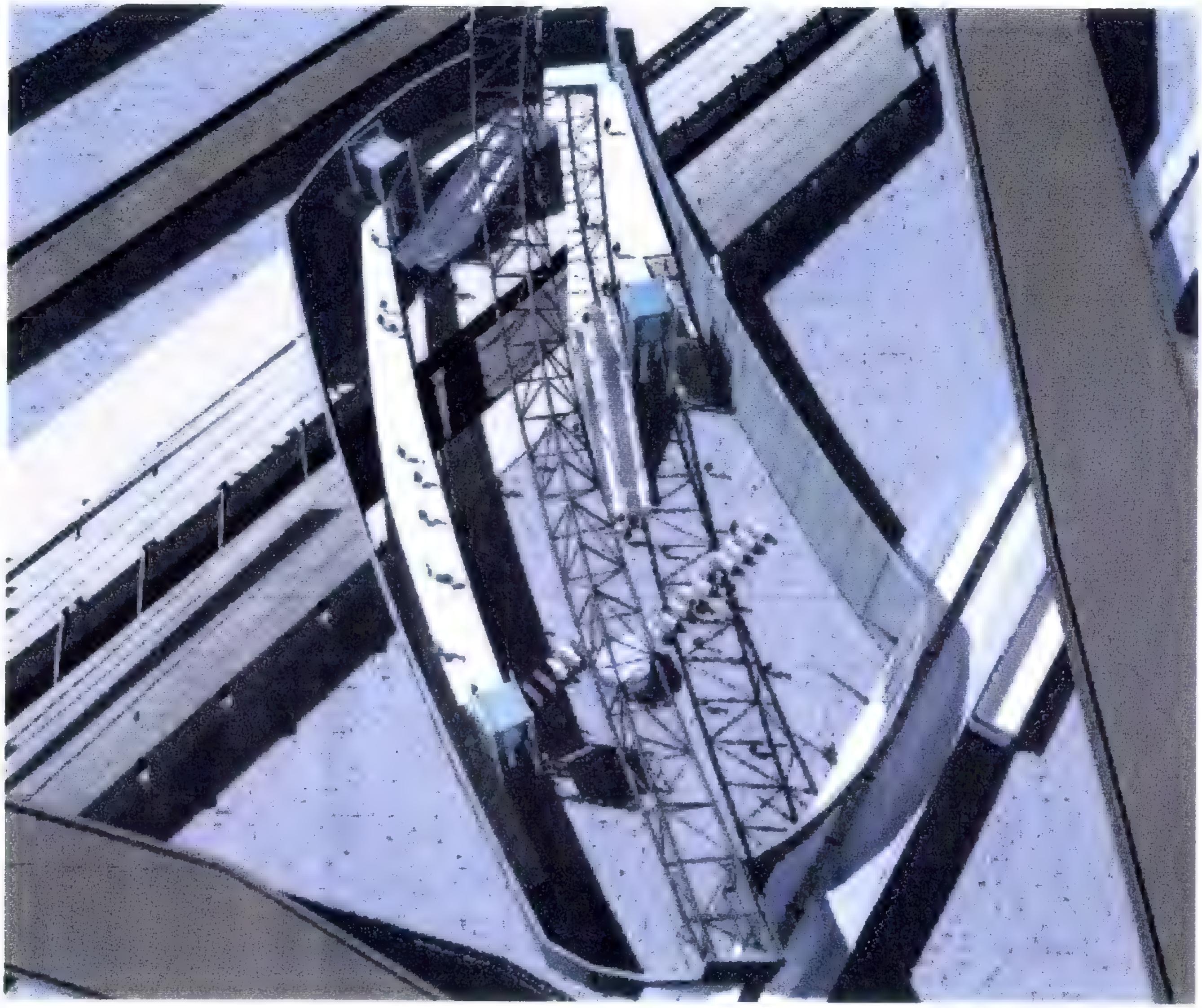
Schemes A and C do not respond to the site as well as Scheme B. Both of those schemes, when viewed in context, appear isolated by the viaducts, whereas Scheme B feels like a natural extension of the context. Ultimately this is critical to the success of the station as an exciting and appropriate response as a 'gateway' station.



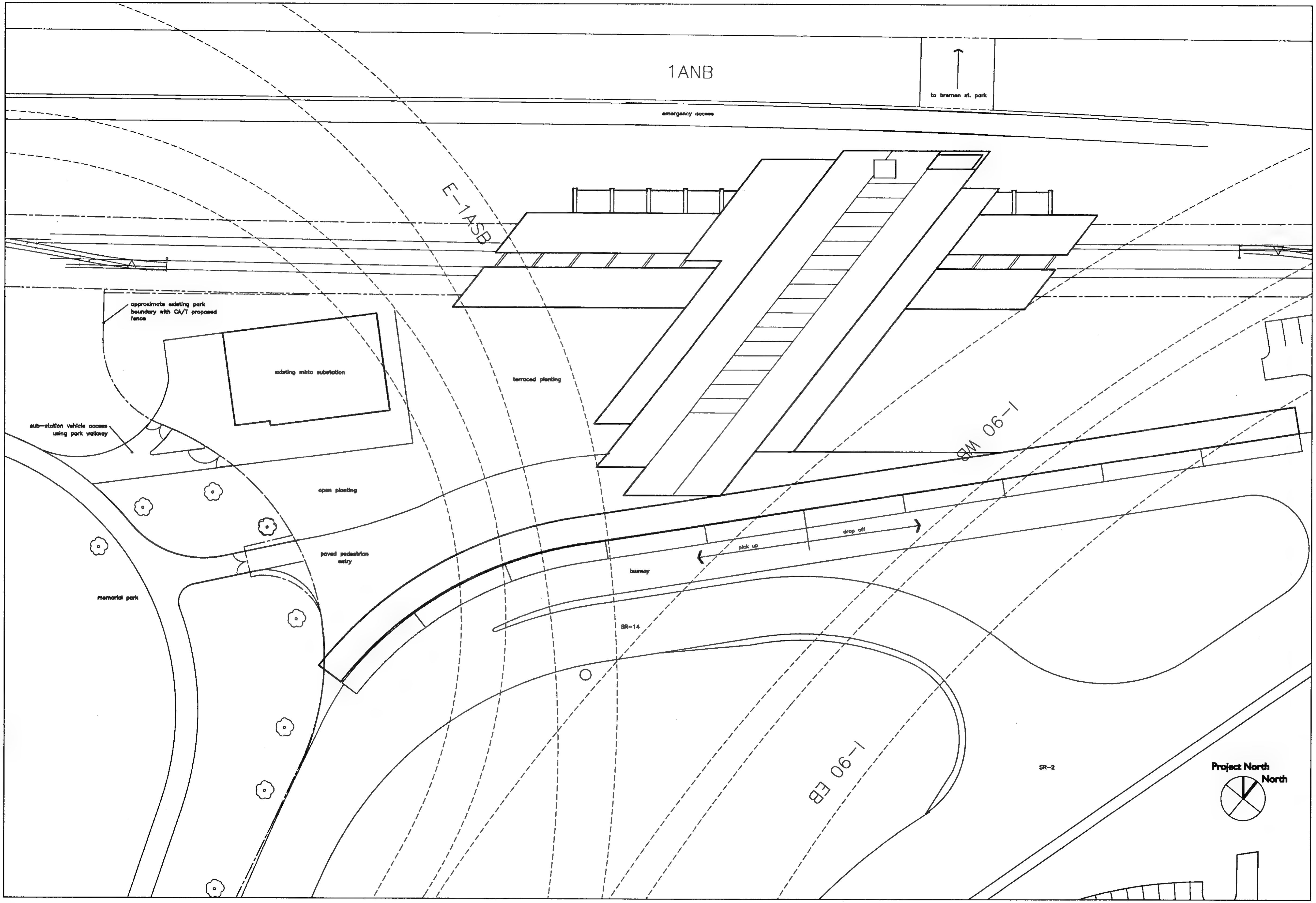
Night view along bus canopy



View along train canopy



View of circulation paths: unpaid in blue/ paid in yellow



Airport Station MBTA
East Boston, MA

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Ammann & Whitney
Structural

Weidlinger Associates
Structural

Bryant Associates
Survey/Civil

GZA GeoEnvironmental Inc.
Geotechnical Engineering

HighlandJackson & Associates
Architectural Subconsultant

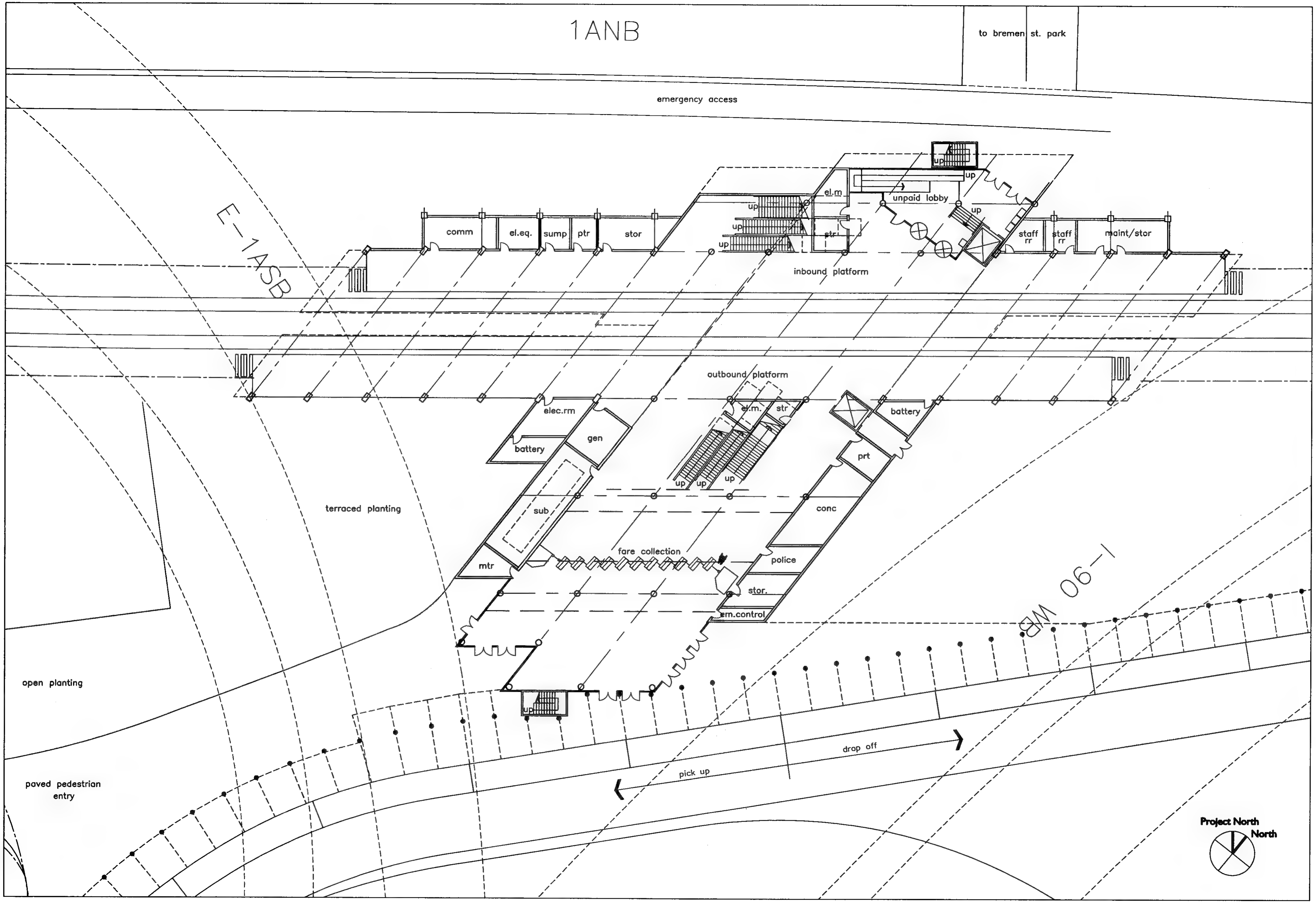
Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

Site Plan
Scheme A

No.	Date	Revision

Job No.	14103
Drawn By:	JR/TR/VA
Checked By:	—
Date:	29 MAY 1998
Scale:	1"=50'
Dwg. No.	

PLOT DATE AND TIME: 17:00 / 29 May 1998 FILE PATH: P:\14103\DRAWINGS\REPORT\



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Airport Station

MBTA

East Boston, MA

Wallace, Floyd, Associates Inc.

Architecture
Landscape Architecture
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Airport Station

Massachusetts Bay Transportation Authority

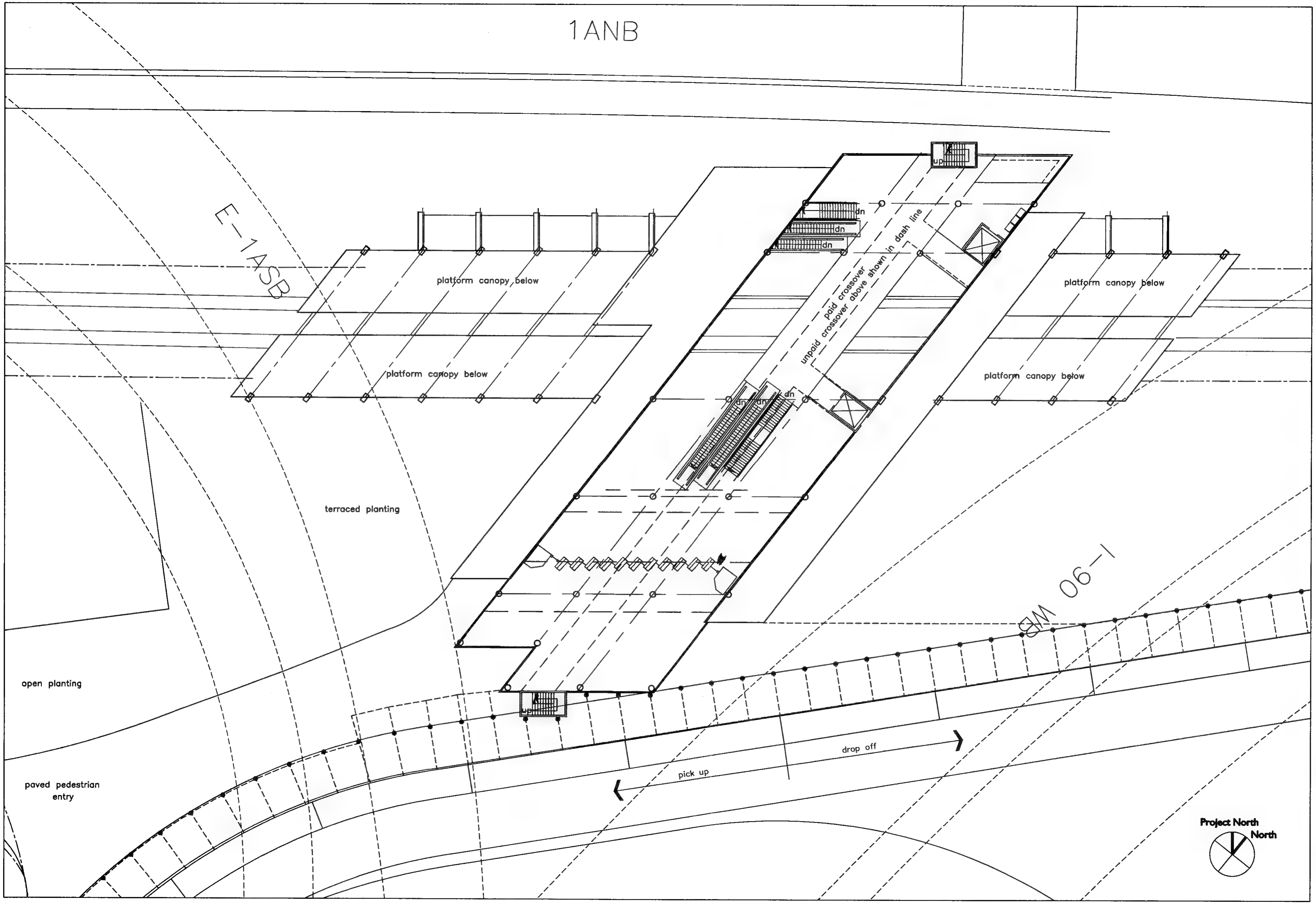
East Boston, Massachusetts

Lower Level Plan

Scheme A

No.	Date	Revision

Job No	14103
Drawn By:	JR/TR/VA
Checked By:	–
Date:	29 MAY 1998
Scale:	1/32"=1'
Dwg. No.	



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Structural

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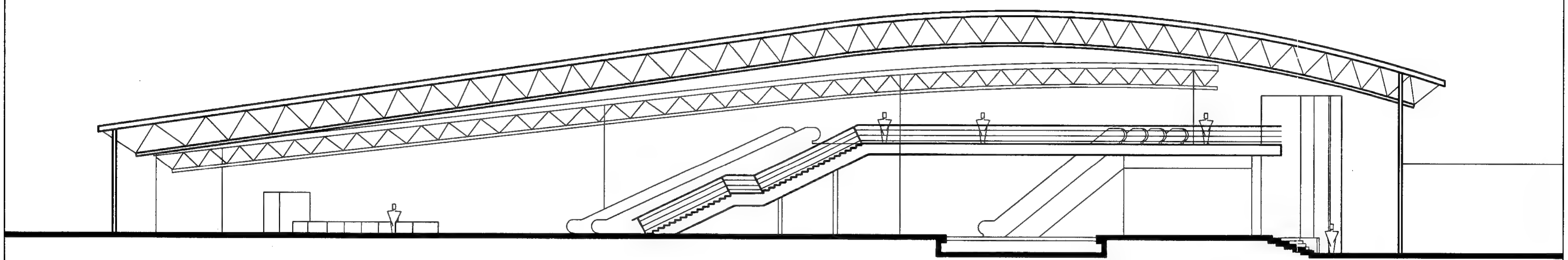
Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

Upper Level Plan
Scheme A

No.	Date	Revision

Job No. 14103
Drawn By: JR/TR/VA
Checked By: —
Date: 29 MAY 1995
Scale: 1/32"=1'
Dwg. No.



Longitudinal Section

PLOT DATE AND TIME: 17:00 / 29 May 1998 FILE PATH: P:\14103\DRAWINGS\REPORT\

Airport Station
MBTA
East Boston, MA

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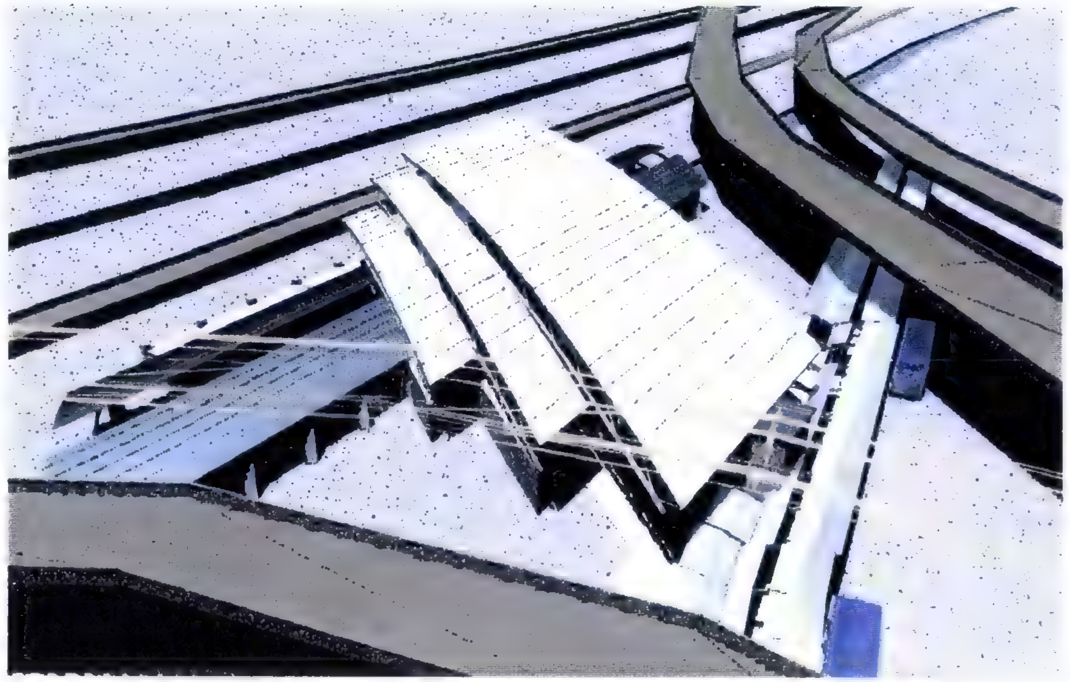
Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

Section
Scheme A

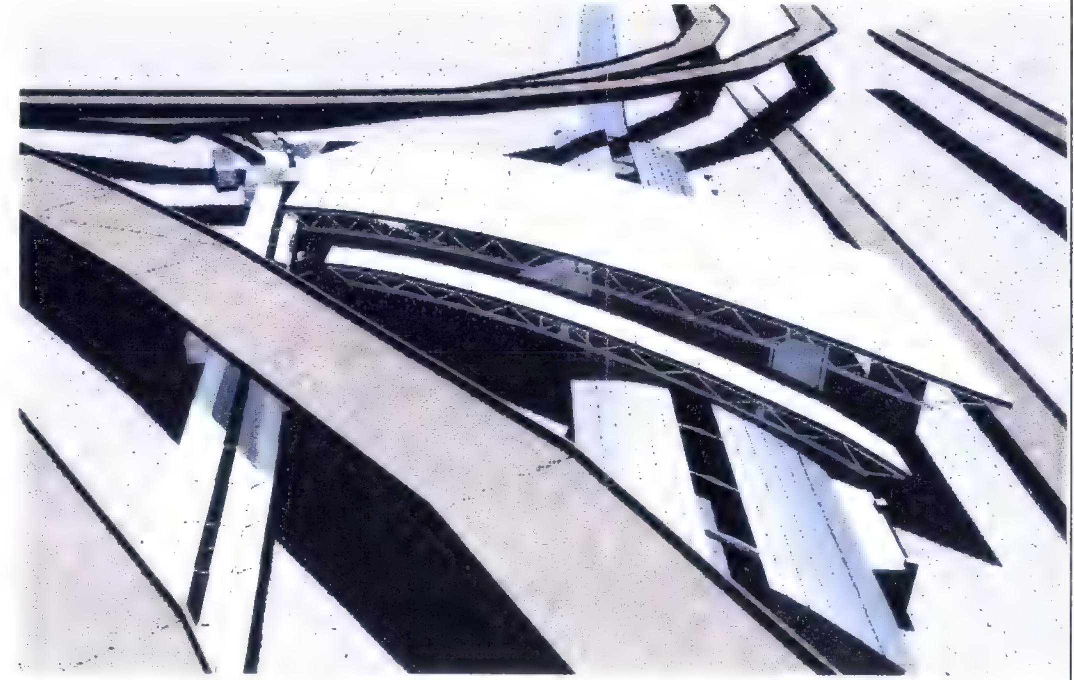
No	Date	Revision

Job No 14103
Drawn By: JR/TR/VA
Checked By: –
Date: 29 MAY 1998
Scale: 1"=20'

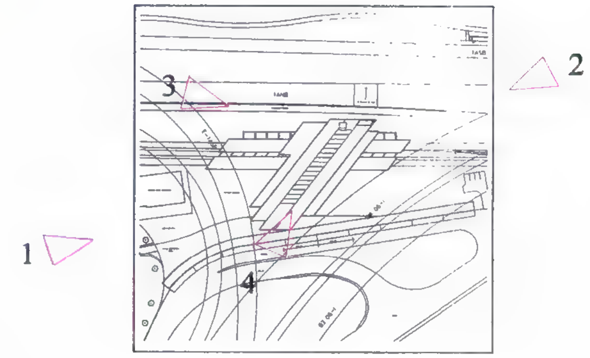
Dwg. No.

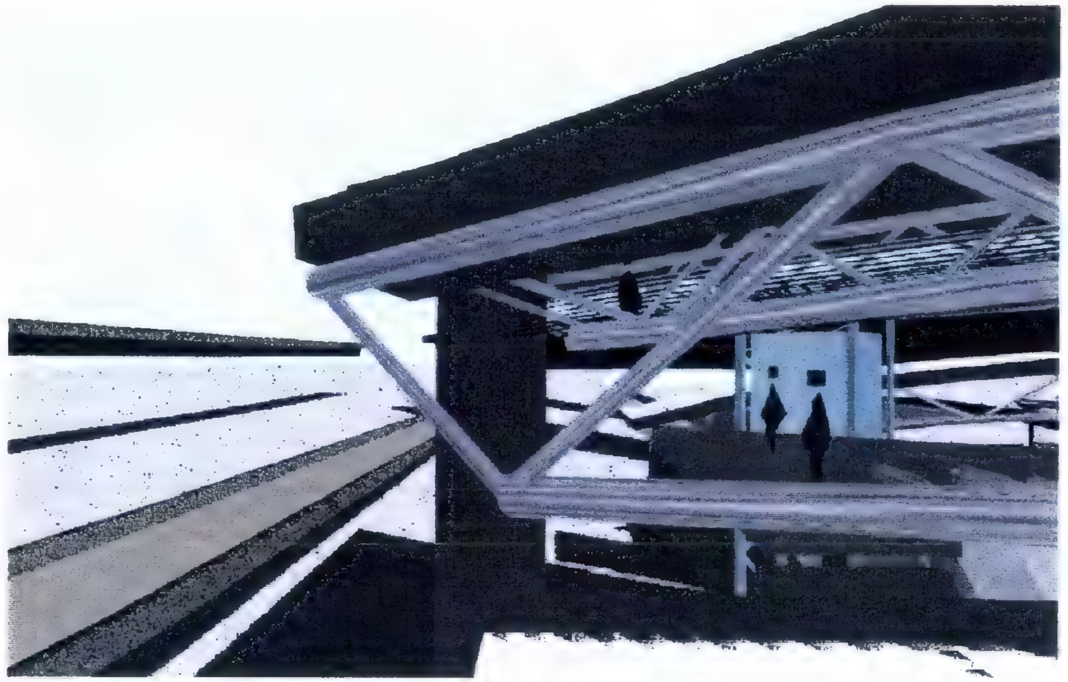


1. Looking towards North

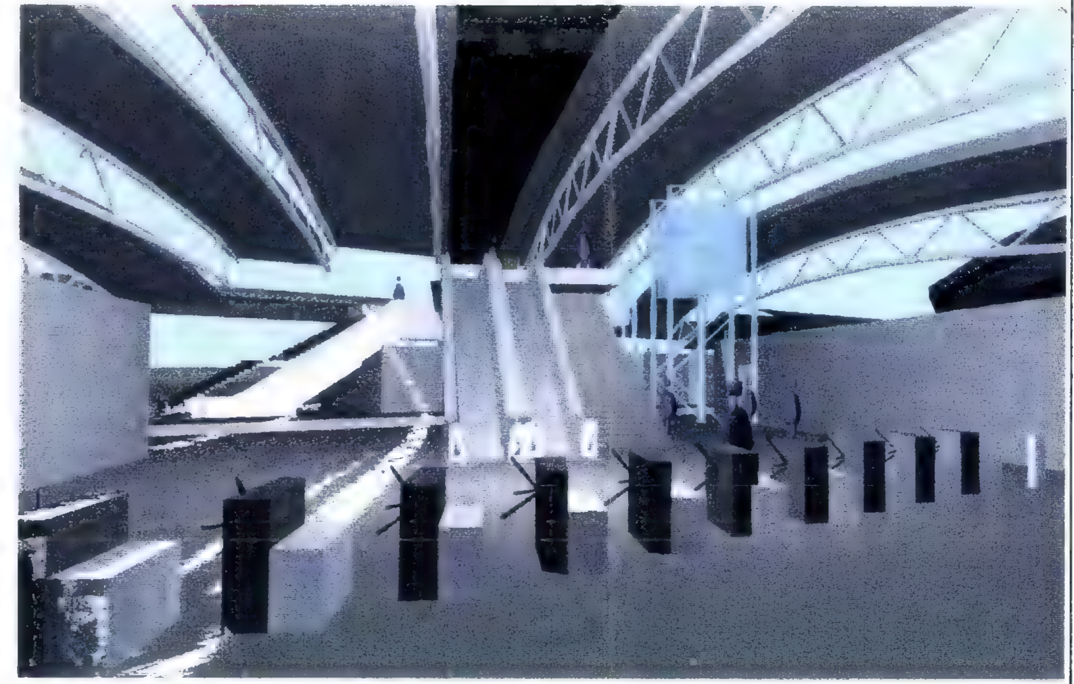


2. Looking inbound towards the city





3. Detail of East Boston Facade



4. View of interior

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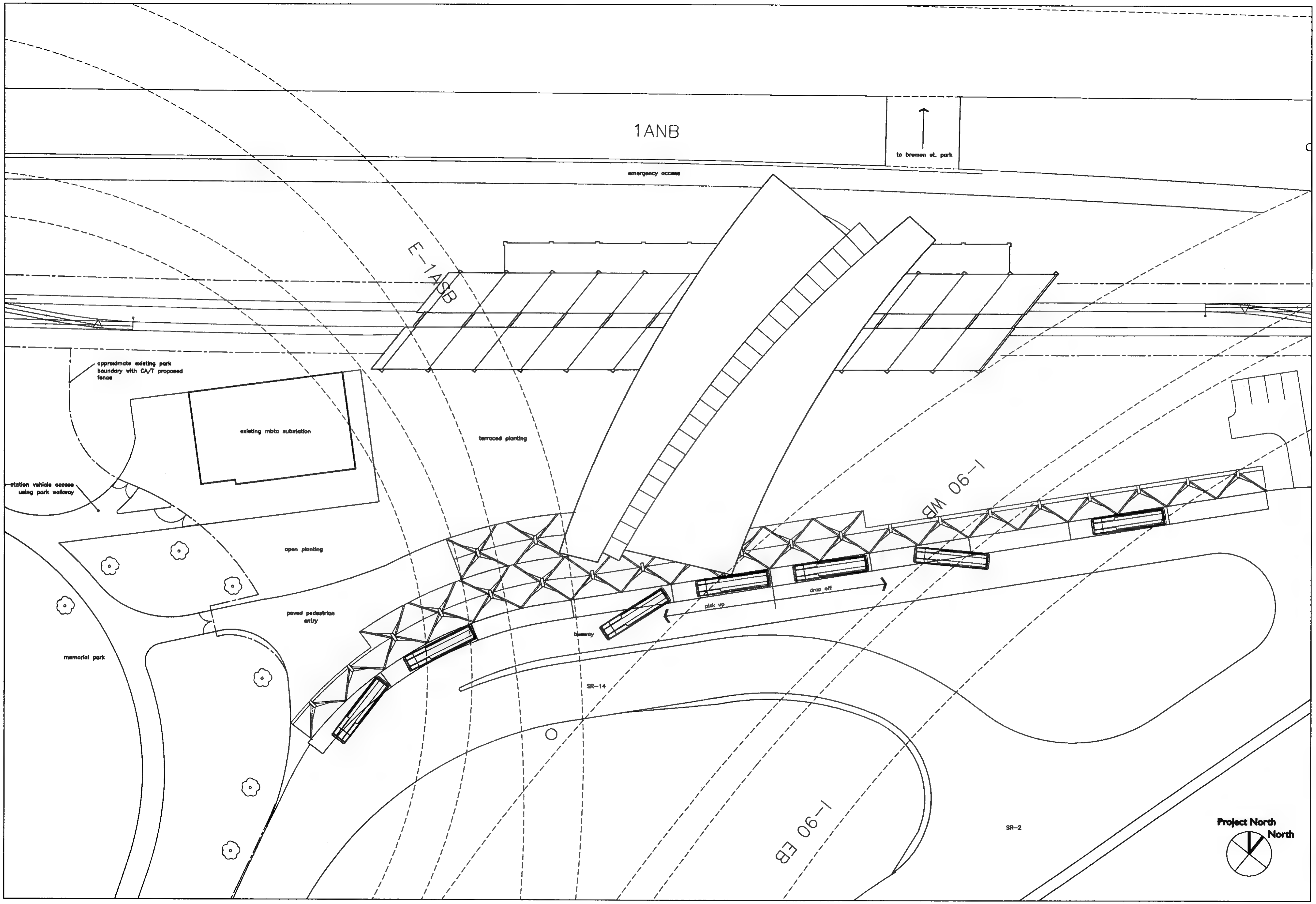
Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

View
Scheme A

No.	Date	Revision

Job No.	14103
Drawn By:	JR/TR/VA
Checked By:	—
Date:	29 MAY 1998
Scale:	
Dwg. No.	



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Airport Station MBTA
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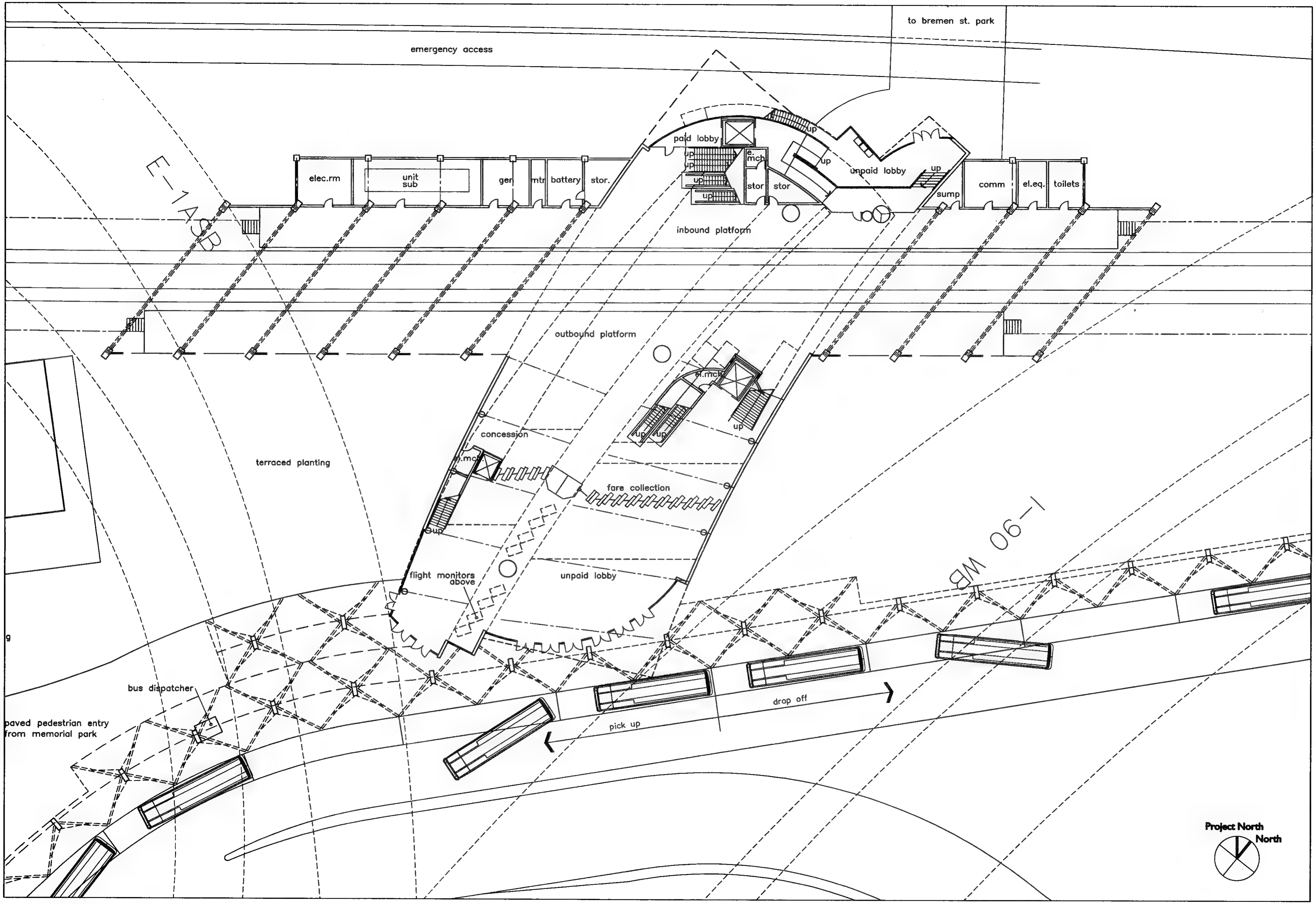
Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

Site Plan
Scheme B

No.	Date	Revision

Job No.	14103
Drawn By:	JR/TR/VA
Checked By:	—
Date:	29 MAY 1995
Scale:	1"=50'
Dwg. No.	



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Airport Station
MBTA
East Boston, MA

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Structural

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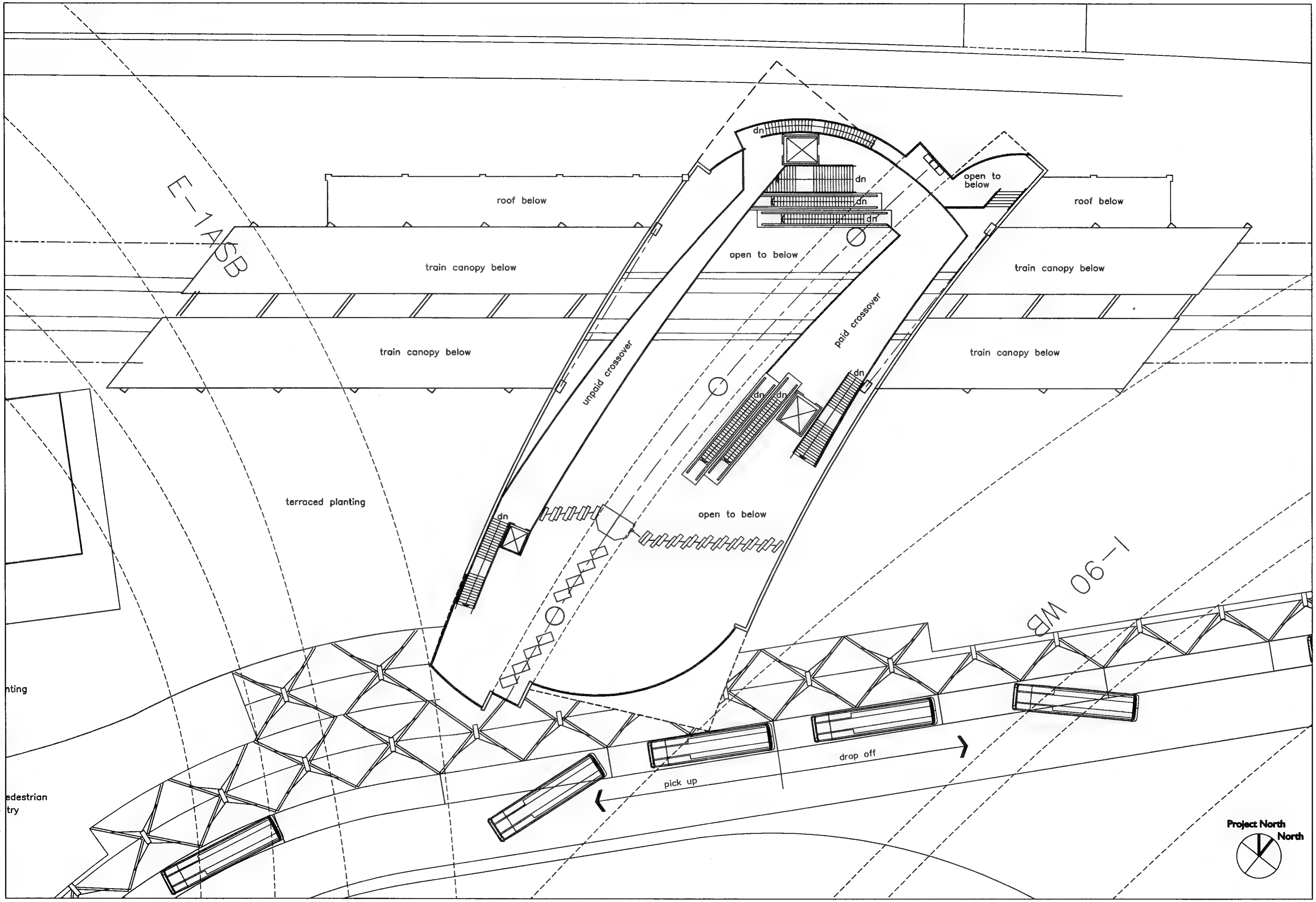
Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

Lower Level Plan
Scheme B

No.	Date	Revision

Job No. 14103
Drawn By: JR/TR/VA
Checked By: –
Date: 29 MAY 1998
Scale: 1/32"=1'–0"
Dwg. No.



Airport Station
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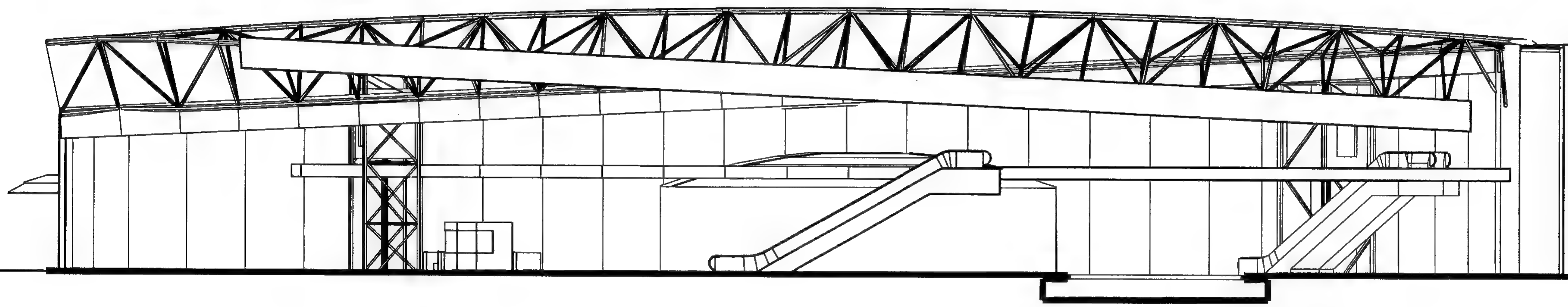
Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

Upper Level Plan
Scheme B

No.	Date	Revision

Job No.	14103
Drawn By:	JR/TR/VA
Checked By:	–
Date:	29 MAY 1998
Scale:	1/32"=1'
Dwg. No.	



Longitudinal Section

Airport Station
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East Boston, MA

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- Landscape Architecture
- Planning
- Urban Design

Ammann & Whitney
- Structural

Weidlinger Associates
- Structural

Bryant Associates
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Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

Section
Scheme B

No.	Date	Revision

Job No.	14103
Drawn By:	JR/TR/VA
Checked By:	—
Date:	29 MAY 1995
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Dwg. No.	

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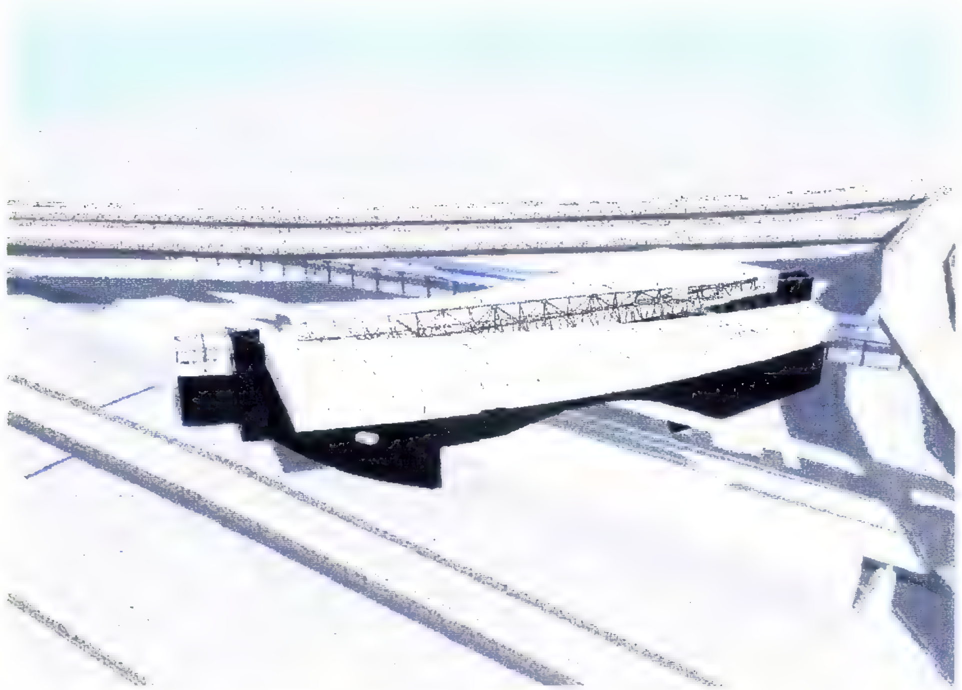
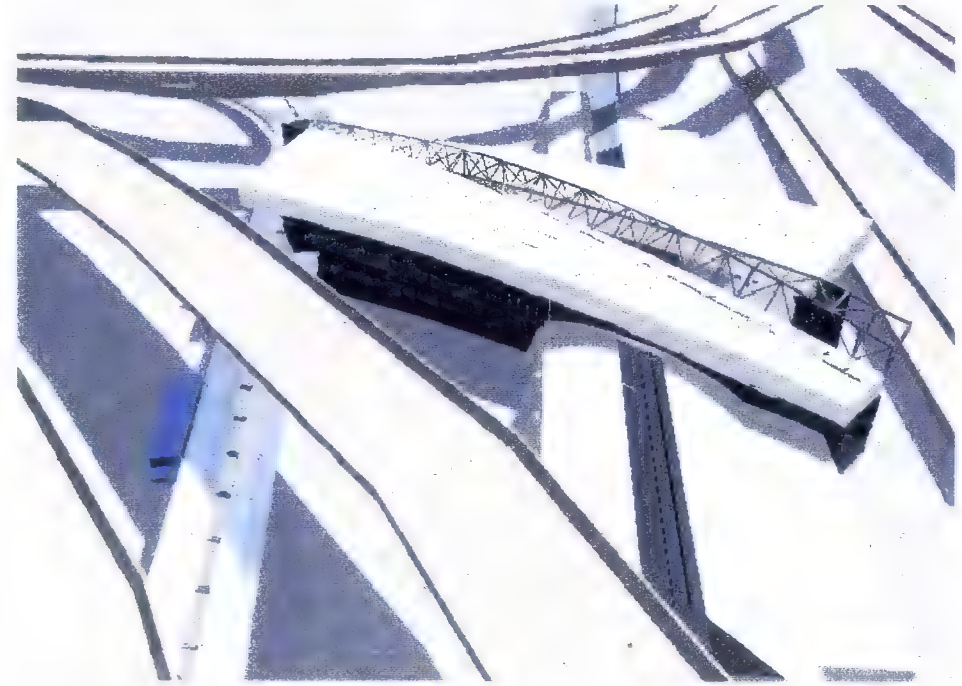
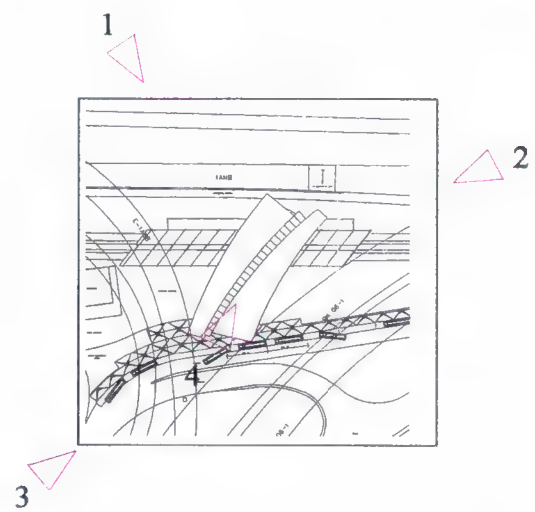
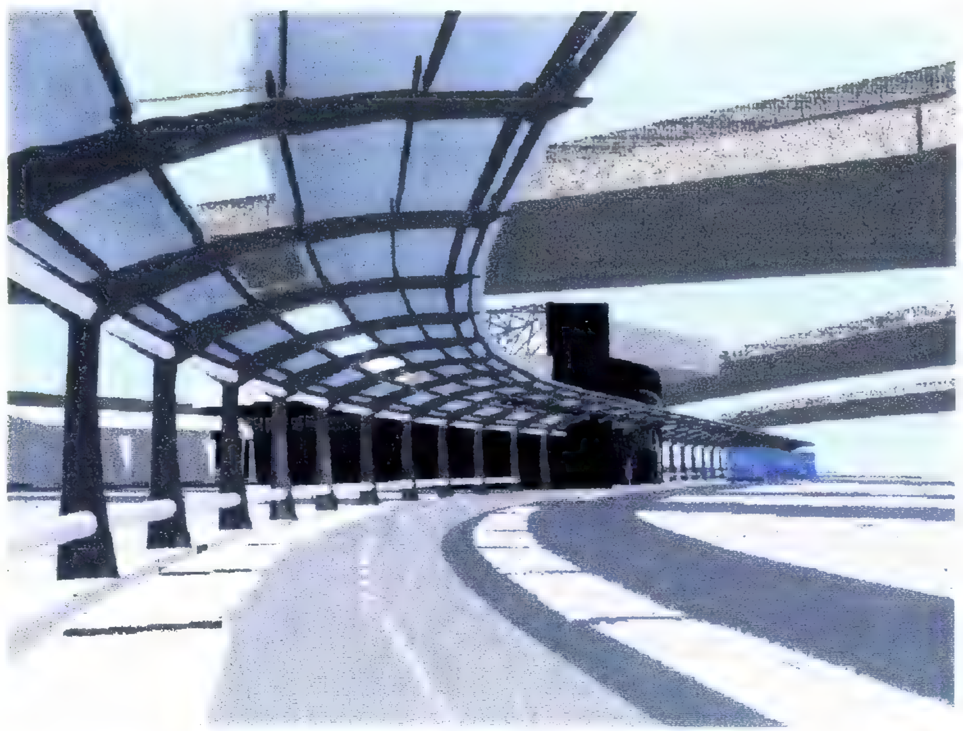


1. Looking towards Airport

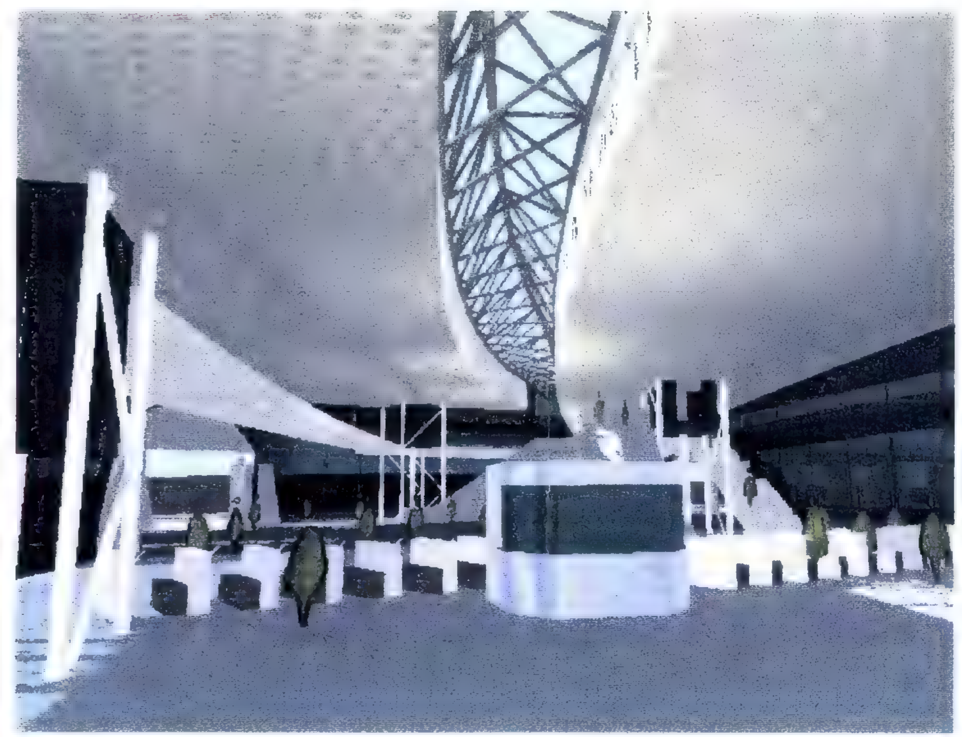


2. Looking inbound towards the city





3. Looking towards entrance from bus canopy



4. View of interior

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East Boston, MA

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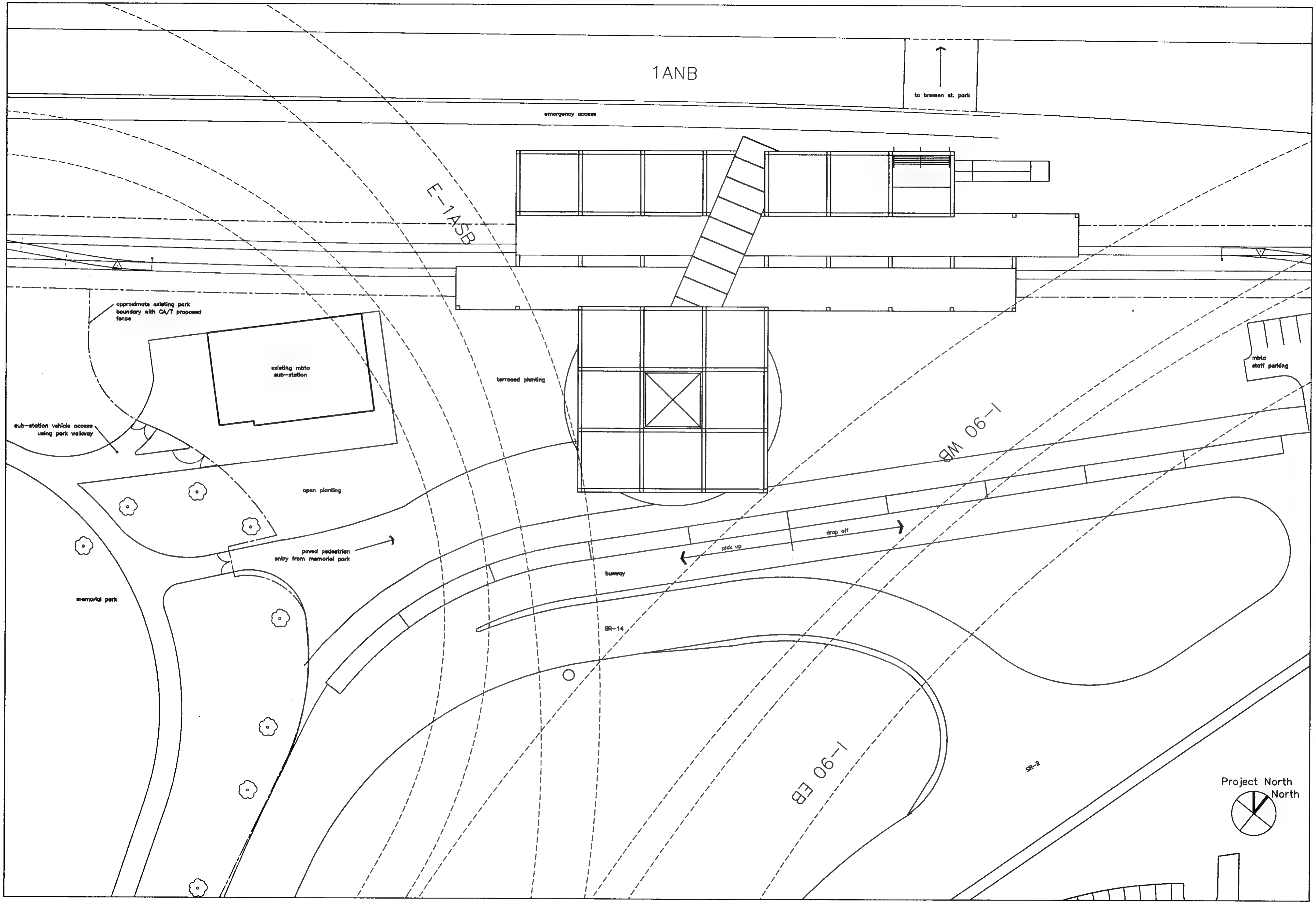
Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

View
Scheme B

No.	Date	Revision

Job No. 14103
Drawn By: JR/TR/VA
Checked By: –
Date: 29 MAY 1995
Scale:
Dwg. No.

PLOT DATE AND TIME: 17:00 / 29 May 1995 FILE PATH: P:\14103\DRAWINGS\REPORT\



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East Boston, MA

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Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

Site Plan
Scheme C

No. Date Revision

Job No.	14103
Drawn By:	JR/TR/VA
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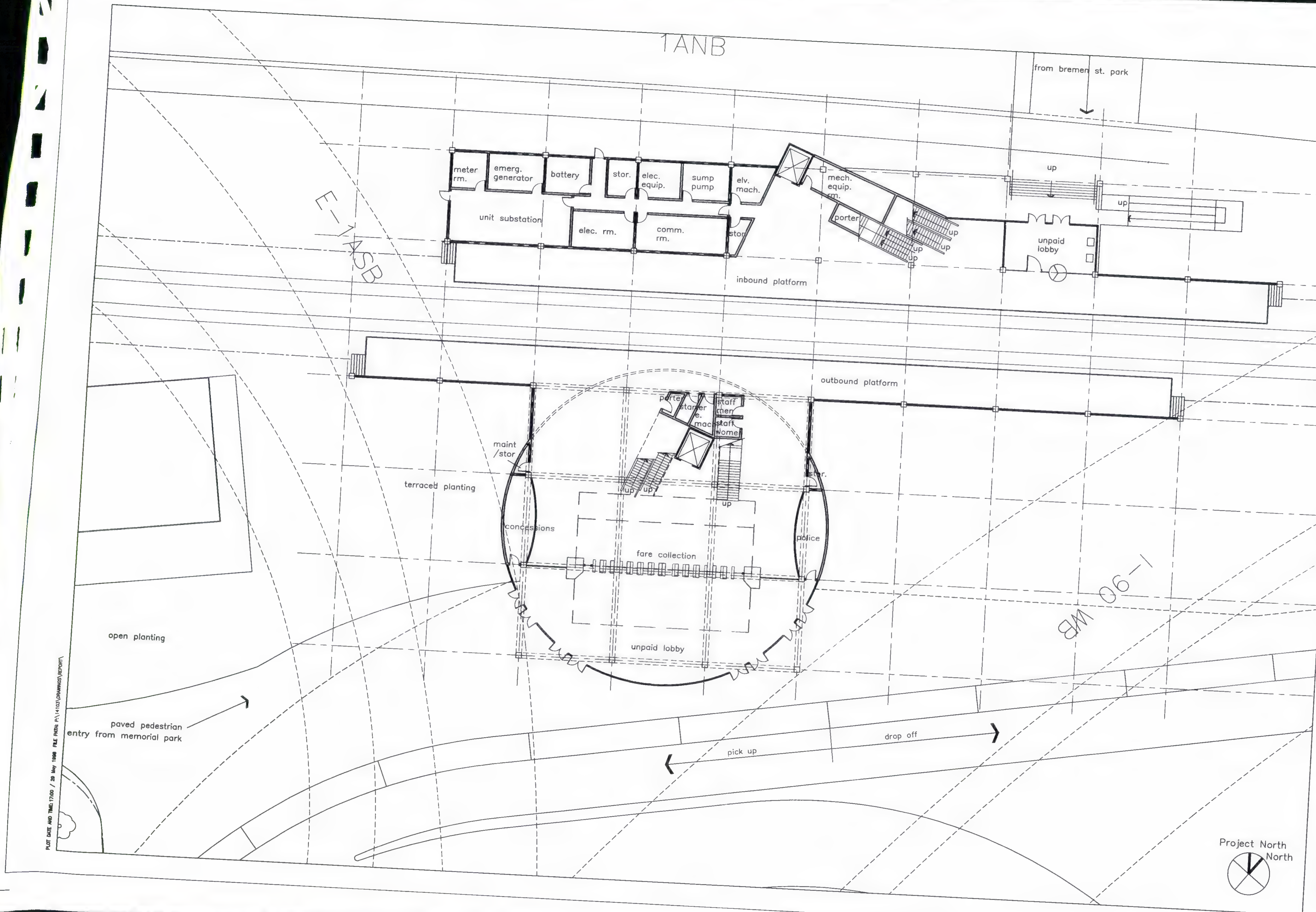
Date:	29 MAY 1995
Scale:	1"=50'
Dwg. No.	



Airport Station
MBTA
East Boston, MA

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Urban Design

Ammann & Whitney
Structural

Weidlinger Associates
Structural

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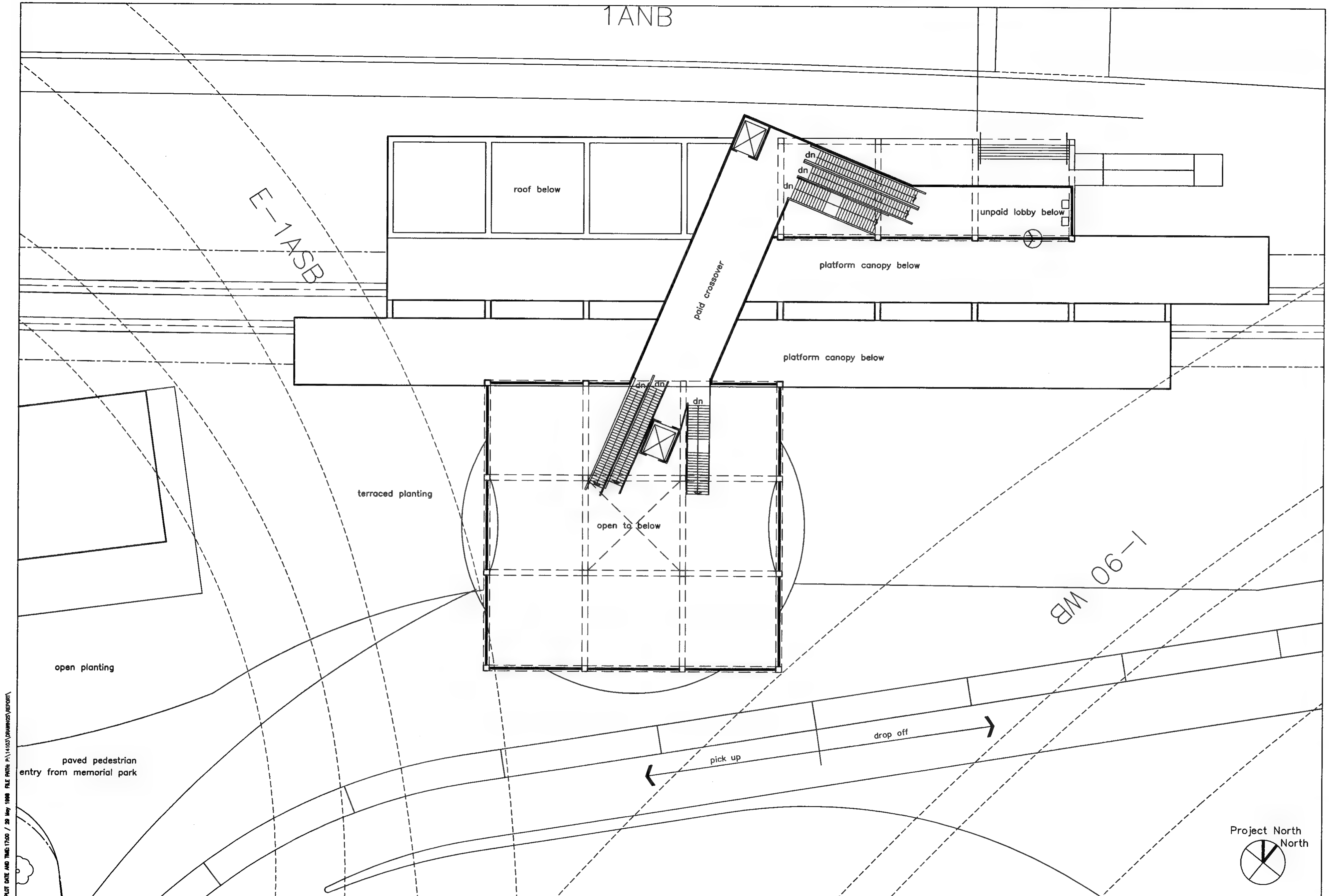
Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

Lower Level Plan
Scheme C

No. Date Revision	
Job No	14103
Drawn By:	JR/TR/VA
Checked By:	—
Date:	29 MAY 1998
Scale:	1/32"=1'
Dwg. No	



Airport Station
MBTA
East Boston, MA

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Planning
Urban Design

Ammann & Whitney
Structural

Weidlinger Associates
Structural

Bryant Associates
Survey/Civil

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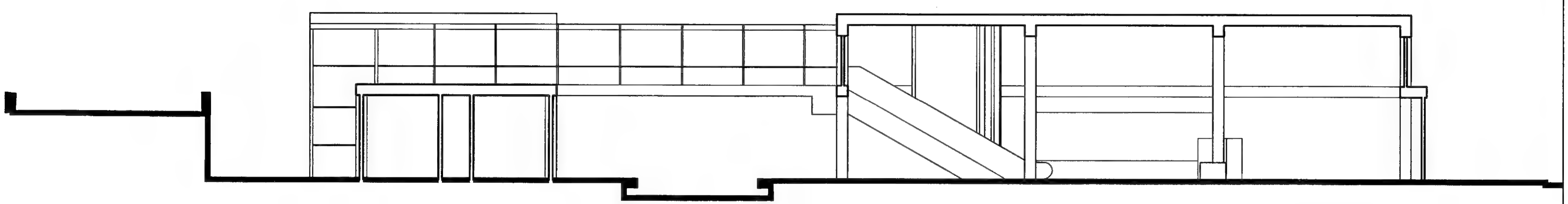
Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

Upper Level Plan
Scheme C

No.	Date	Revision

Job No.	14103
Drawn By:	JR/TR/VA
Checked By:	—
Date:	29 MAY 1996
Scale:	1/32"=1'
Dwg. No.	



Longitudinal Section

Airport Station
MBTA
East Boston, MA

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Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

Section
Scheme C

No. Date Revision

Job No.	14103
Drawn By:	JR/TR/VA
Checked By:	—
Date:	29 MAY 1995
Scale:	1"=20'
Dwg. No.	

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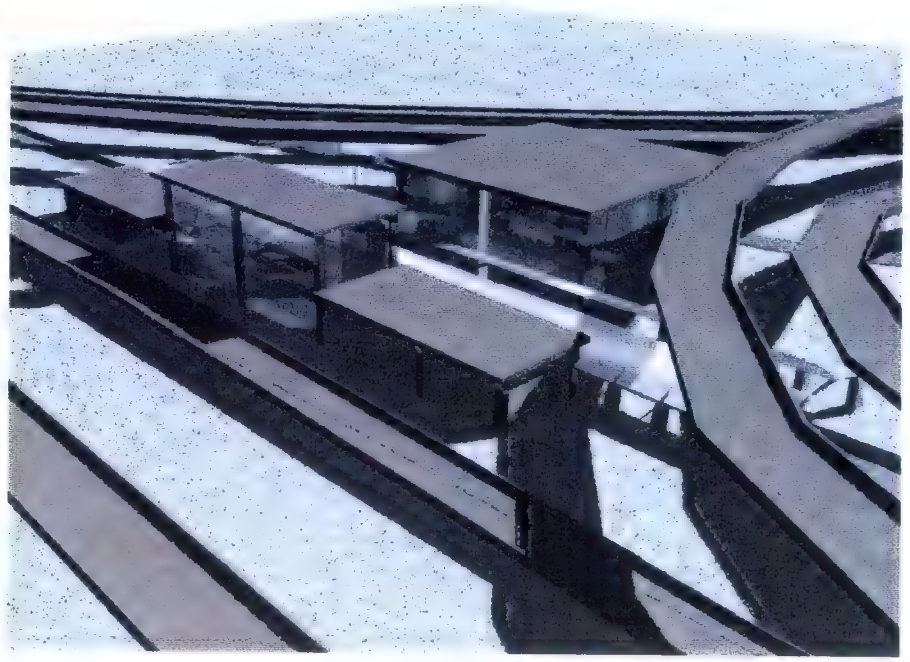
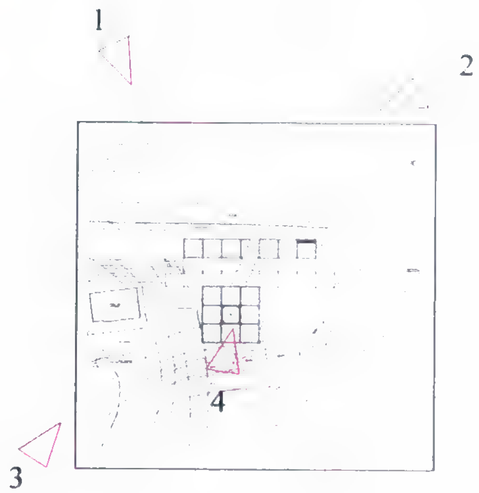
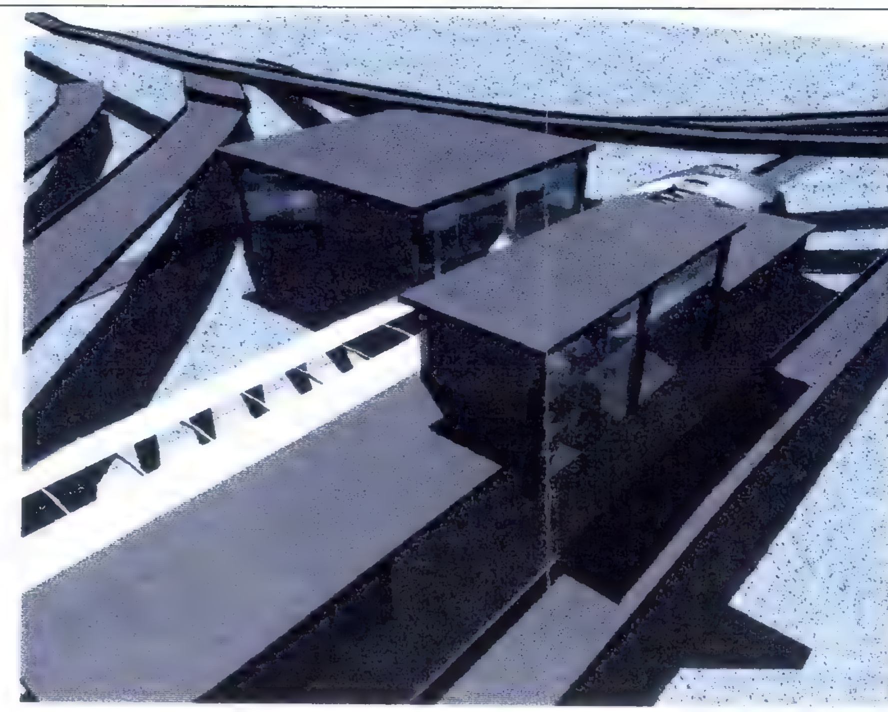
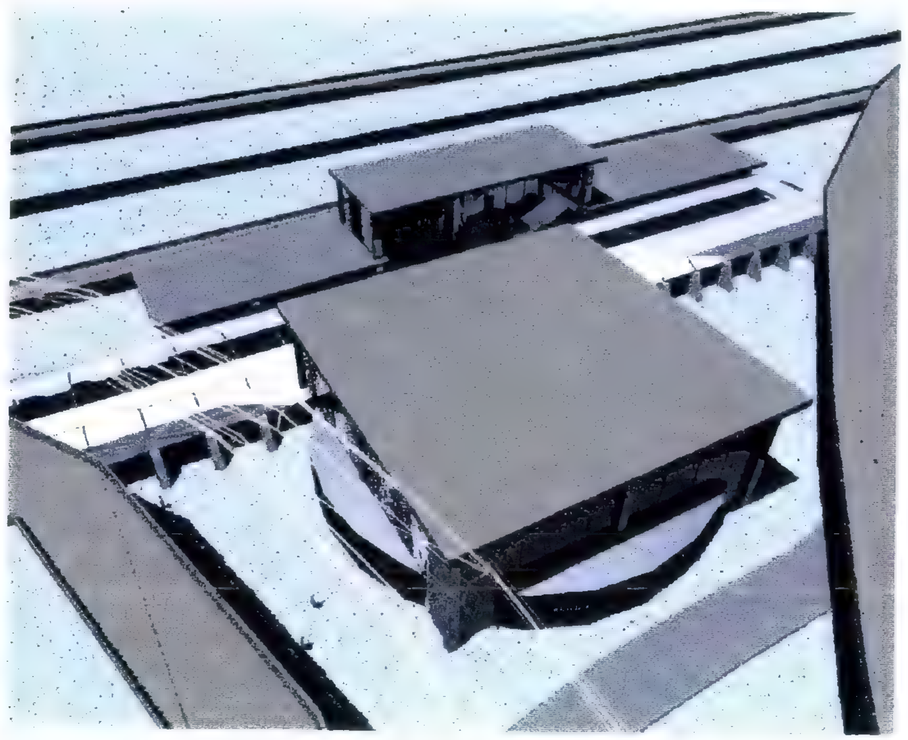


1. View from East Boston

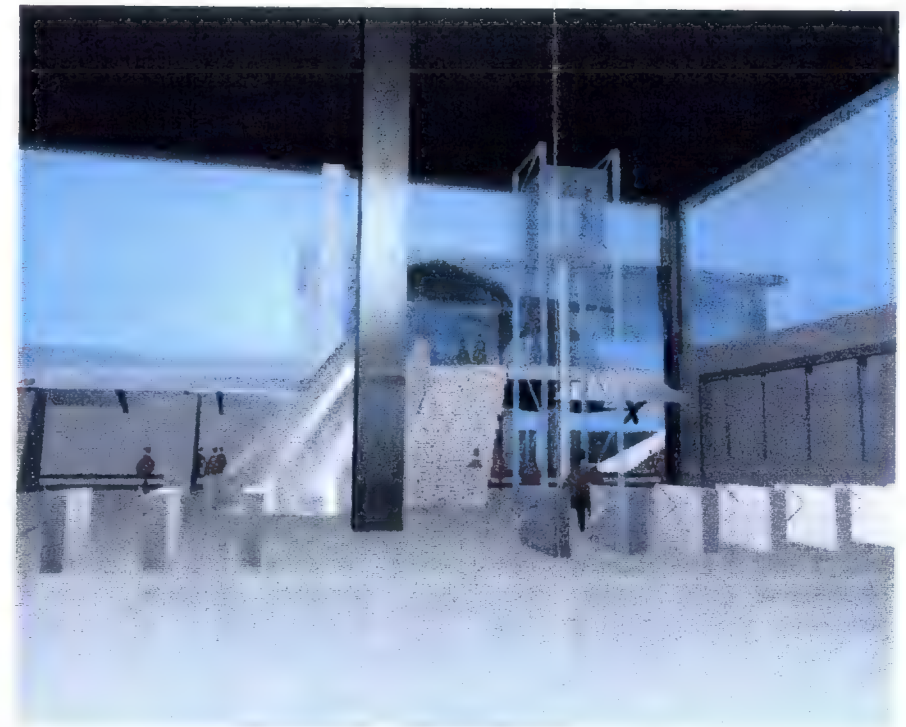




2. Looking inbound towards the city



3. Overview looking North



4. View of interior

Airport Station
MBTA
East Boston, MA

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Weidlinger Associates
Structural

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GZA GeoEnvironmental Inc.
Geotechnical Engineering

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Architectural Subconsultant

Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

View
Scheme C

No	Date	Revision

Job No	14103
Drawn By	JR/TR/VA
Checked By	—
Date	[illegible] MAY [illegible]
Scale	
Dwg. No	

Arts Program

The Airport Station Project will include the selection and installation of artwork as part of the station design and construction. The MBTA, in accordance with Federal Transit Administration (FTA) guidelines, will utilize one half of one percent of the construction project budget to be expended on art, on projects which receive DOT funds. The art budget is a fixed sum set aside in the construction budget for a public art site.

Artists are selected through a formal process which is designed to be flexible and democratic, and to include community involvement as well as individuals knowledgeable about contemporary public art. The selection process is a non-political process which is separate from the station design process managed by the MBTA. The goal is to choose art that is integrated with the architecture, specific to the site and accessible to the public.

Program

The station will serve Massport buses to and from Logan Airport, rental car and hotel shuttle buses, and the Blue Line subway. Outdoor bus platforms will be sheltered with continuous canopies. Public indoor spaces will include fare collection; a small concession area; stairs, elevators and escalators; and a lobby area. The building will also house an MBTA police substation; staff restrooms; bus dispatcher's room and rooms for maintenance, mechanical, electrical and emergency equipment. The complete program is detailed on the following pages.

Additional detailed information on station ridership and program is available in the Appendices. Appendix A provides ridership analysis based on existing ridership and projections by Central Planning Transportation Staff (CTPS) of ridership in the year 2010. Appendix B lists criteria for passenger flows through the typical elements of a station. Appendix C provides written and graphic analysis of the requirements for major station components, such as fare collection and vertical circulation. Appendix D provides a program comparison of several MBTA stations similar to the new Airport Station in size or function.

MBTA Airport Station Program

Program Elements	Comments	Total SF	Description

Primary Entrance

Located at the outbound side of the Blue Line tracks, this portion of the station will serve as an orientation and waiting area and the primary fare collection area for the passenger.

Program Elements	Comments	Total SF	Description
Unpaid Lobby	Primary Entrance		Direct access to fare collection and bus platforms
Newsstand		200	
Flight Monitors/Viewing		200	
Ticket Vending Machines		950	
Information		100	
Public Telephones		50	
Waiting/Circulation		1500	
Subtotal		**3000**	
Fare Collection/Queuing	MBTA Control	2900	Min. 12 turnstiles- each with 12" luggage slide
Subtotal		**2900**	
Station Subtotal		**5900**	

Primary Entrance Support

These spaces serve as direct support to the primary lobby and are located either within the lobby or immediately adjacent to it.

Program Elements	Comments	Total SF	Description
Concession	Private Vendor	600	Either permanent location or push cart type
Subtotal		**600**	
Porter's Room	Outbound side	80	Location for janitorial supplies and equipment
Subtotal		**80**	
MBTA Police Substation		100	Space for one officer with phone connection and computer terminal
Subtotal		**100**	
Emergency Control Room		70	Location of station fire alarm control panels and other emergency systems support
Subtotal		**70**	
Station Subtotal		**850**	

MBTA Airport Station Program

Program Elements	Comments	Total SF	Description
Pedestrian Crossovers			

Two crossovers provide grade separated pedestrian connections from one side of the Blue Line tracks to the other. The paid crossover allows passengers to move from fare collection directly to the trains and vice versa. The unpaid crossover allows a free pedestrian connection through the station from the Bremen Street Park and neighborhood to Logan Airport and Memorial Stadium Park.

Program Elements	Comments	Total SF	Description
Paid Crossover		2400	
Subtotal		**2400**	
Oversized Elevator	Outbound side	150	Accommodates passengers with luggage
Elevator Machine Room	of tracks	80	
Subtotal		**230**	Cab approx. 8'x10'
(2) Escalators	Outbound side	540	Heavy-duty transit, 2 level step, 40" tread width
Esc/stair Run-off	of tracks	250	
Subtotal		**790**	
Public Stair	Outbound side	320	Assume 8' width minimum
Subtotal		**320**	
Oversized Elevator	Inbound side	150	Accommodates passengers with luggage
Elevator Machine Room	of tracks	80	
Subtotal		**230**	Cab approx. 8'x10'
(2) Escalators	Inbound side	540	Heavy-duty transit, 2 level step, 40" tread width
Esc/stair Run-off	of tracks	250	
Subtotal		**790**	
Public Stair	Inbound side	320	Assume 8' width minimum
Subtotal		**320**	
Unpaid Crossover		1400	Pedestrian access from East Boston/Bremen Street Park to Logan Airport/ Memorial Park
Subtotal		**1400**	
Unpaid Stairs/Elevator		460	Standard size accessible elevator (outbound side only)
Subtotal		**460**	
Station Subtotal		**6940**	

MBTA Airport Station Program

Program Elements	Comments	Total SF	Description
Secondary Lobby			
Located at the inbound side of the Blue Line tracks, this portion of the station serves as an entry point for the Bremen Street community.			
Secondary Lobby	Inbound side	1000	Includes unstaffed fare collection, token machines, change machine, allows access for the disabled from grade up to station floor level.
Subtotal		**1000**	
Porter's room	Inbound side	80	
Subtotal		**80**	
Station Subtotal		**1080**	

Program Elements	Comments	Total SF	Description
Train Platform Functions			
Support and waiting areas for the inbound and outbound train platforms.			
Train Platforms			Platforms to be 300' in length and 15' in width to accommodate future 6-car trains. Platforms to be fully covered.
Inbound		4500	
Outbound		4500	
Subtotal		**9000**	
Starter's Booth	Inbound side	70	
Subtotal		**70**	
Starter's Booth	Outbound side	70	
Subtotal		**70**	
Station Subtotal		**9140**	

MBTA Airport Station Program

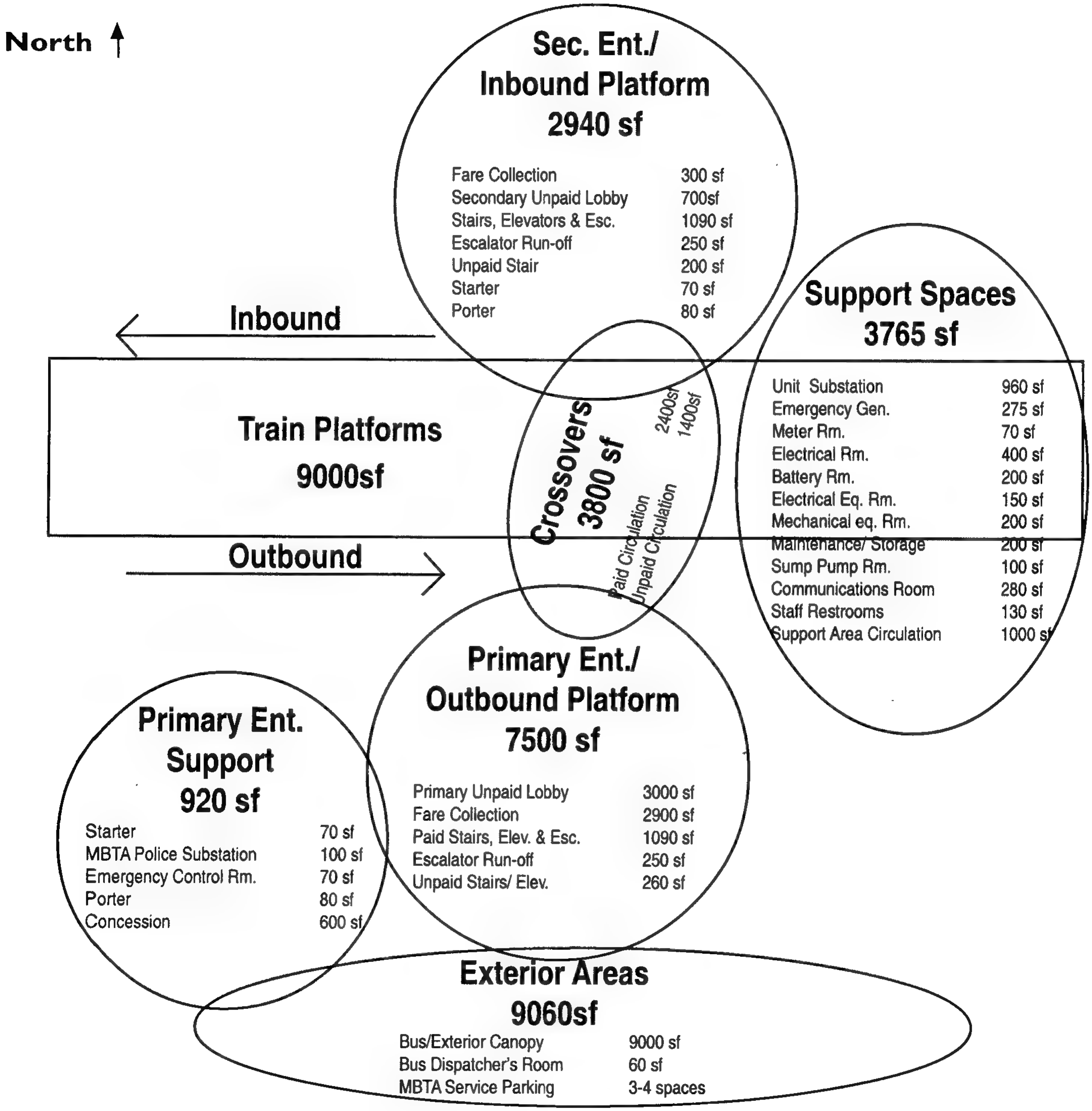
Program Elements	Comments	Total SF	Description
Support Spaces			
These areas provide the support services for the station's effective operation.			
Support Area Circulation		1000	
Subtotal		**1000**	
Communications Room		280	Location of racks for fiber optics, CCTV, telephone, PA system,
Subtotal		**280**	radio repeater
Unit Substation		960	Converts 13.8kV power to 480V
Subtotal		**960**	for building power.
Electrical Room		400	
Subtotal		**400**	
Battery UPS Room		200	
Subtotal		**200**	
Emergency Generator		275	
Subtotal		**275**	
Electrical Equipment Room		150	
Subtotal		**150**	
Mechanical Equipment Room		200	
Subtotal		**200**	
Maintenance/Storage		200	
Subtotal		**200**	
Sump Pump Room		100	
Subtotal		**100**	
Meter Room		70	
Subtotal		**70**	
Staff Women's Restroom		65	
Subtotal		**65**	
Staff Men's Restroom		65	
Subtotal		**65**	
Station Subtotal		**3965**	
Gross Building Square Footage		**27875**	

MBTA Airport Station Program

Program Elements	Comments	Total SF	Description
Exterior Areas			
Bus Platform	Fully covered- 13'-6" min. vert. clearance	9000	15' sidewalk depth, 550' curb length
Subtotal		**9000**	Direct connection to building
Massport Bus Dispatcher's Booth		60	May be free standing
Subtotal		**60**	View to pick-up bus bays
MBTA Service Parking/Service Plaza			3-4 parking spaces on outbound side, east side of station
Plaza Area			West entry plaza with pedestrian paving, landscaping, site lighting and furnishings

Airport Station

Conceptual Design Building Program Diagram



A conceptual diagram of the building program is shown on the following page. The major groupings of program elements are shown in their approximate required location in relation to the station platforms. The support spaces are shown straddling the platforms to indicate that they could be located on either side of the station.

Design Criteria

Airport Station will be an entirely new station, constructed of quality materials, affording a minimum of long-term maintenance for the MBTA. The station must be fully accessible for the disabled and, due to a large percentage of out-of-town and international users, its public circulation areas must be very clearly arranged and understandable, both internal to the station and as it interfaces with the Massport bus connection to Logan Airport.

The new station will be designed to serve the Blue Line trains, both existing four-car trains and future six-car trains. Massport's bus shuttle connection to Logan Airport will be located at the southern edge of the limit of work. At the time of this writing, Massport has requested ten fully covered bus bays at 55 feet each to be located along the southerly edge of the site. Eight of the bus bays will accommodate normal daily use, while the remaining two will accommodate hotel and rental car shuttles. No public vehicular access or separate dedicated spaces for future Urban Ring vehicles will be provided at this time; dedicated spaces for future Urban Ring vehicles are presently planned to share two bus bays with Massport shuttle buses.

Pedestrian access to and from the station will be as described below.

Architectural Design Criteria

The following identifies primary design issues to be considered in the design of the station.

General Station Criteria

- MBTA focus on patron service first and foremost
- quality architectural expression and image appropriate to MBTA gateway station
- full station enclosure for patron comfort; though station generally will not be mechanically heated/cooled, platforms will be fully covered with trainway open above and at ends
- station accommodating to international patrons/first time visitors as well as regular use by local residents
- station to accommodate large daily peak hour crowds, as projected by the Central Transportation Planning Staff (CTPS), but consistent with human scale in off-peak hours

Pedestrian Access/Egress

Access required to and from:

- Memorial Stadium Park - direct access through the park from Porter Street neighborhoods will be provided in the CA/T Project's Memorial Stadium Park design.
- Bremen Street neighborhood - direct access through proposed Bremen Street Park across from Brook Street via an underpass at Route 1A northbound provided by CA/T design.
- North Cargo area-access for employees by a sidewalk along Massport's at grade SR 2

roadway.

- no separate pedestrian access to station expected to/from terminals/hotels/rental car area, other than via bus drop-off/pickup area.

Criteria

- *safety* - station to address community concerns relative to pedestrian approach through Memorial Stadium Park and Bremen Street Park - station entry visible from a distance; easily identifiable location; well lighted.
- *convenience* - at grade entries with paid and unpaid crossover required; minimize length; minimize need for vertical circulation
- *maintenance* - ease of maintenance, specifically at the exterior 'plaza' areas of the station and along access routes.
- *access* - access for the disabled should coincide with access for the general public, where possible
- *egress* - emergency egress must be distributed over station area, so may result in many egress points; typically must egress to a public way or area of safe refuge

Patron Circulation

See ridership numbers from 1994 CTPS rider counts for Airport Station and CTPS Logan Ground Access Model showing average weekday totals projected for the year 2010 in Appendix A.

Criteria

to connect pedestrian and vehicular access locations with platform locations

- clarity and convenience of movement - direct routes are critical considering out-of-town and international patrons unfamiliar with Blue Line:
- optimize access to vertical circulation
- provide redundancy in devices such as escalators as needed to maintain service
- coordinate with architecture and signage to make routes as clear as possible
- coordinate with fare collection locations
- international patrons need extra clarity/possible international signage/graphics - possibly related to Logan 2000 graphics
- safety - designated as a CCTV monitoring 'hub'; surveillance of 4-5 adjacent Blue Line stations
- capacity for peak ridership volumes, including large number of riders with luggage (*see Appendix B*)
- capacity for queuing at pressure points
- avoid conflicts among different circulation routes
- circulation routes for the disabled should coincide with routes for the general public
- prefer entry routes through fare collection to be separate from exit or emergency egress routes
- patron entry/exit and circulation routes should be available during normal station hours of operation

Fare Collection

- design for current fare collection system while making provisions for proposed new fare collection system (*see Appendix C*)

- assume fare collection required between all modes (pedestrian, bus etc.)
- current fare collection requires staffed collection booths at primary entrance
- future fare collection will include a customer service information desk with a service attendant that would be available to monitor other stations
- efficient configuration for fare collection location(s) preferred
- locations must be coordinated with pedestrian and vehicular access points and routes to platforms
- all turnstiles at primary entrance to be oversized to accommodate luggage and will be able to operate in either entrance or exit mode

Platforms

Blue Line Platforms

- 6-car trains - platforms 300 feet long as per direction provided by the MBTA
- assume paid crossover between inbound and outbound platforms and separate unpaid crossover between primary and secondary lobbies
- assume no design impact from proposed future introduction of new Blue Line cars

Bus Platforms

- as provided by Massport, ten 55' bus bays - approximately 550' of curb length; bus platform covered for entire length
- bus platform canopy, lighting, signage, furnishings by MBTA, coordinated with Massport
- busway roadway design and construction by CA/T, coordinated with Massport

Service Spaces

- toilets - staff only
- other required service spaces per detailed program

Materials and Furnishings

Required

- telephones (conventional/TDD), seating, trash receptacles, advertising, maps and signage, public address system
- tactile warning strips required at Blue Line platform edges; assume tactile warning strips not provided at busway curb
- sand storage bins
- public art

Desirable

- clocks, non-MBTA maps and signage, flight monitors, bicycle racks, newspaper vending machines, vending/concession space
- exterior landscaping if appropriate to the station footprint and surrounding uses

Criteria

- durable materials to minimize maintenance, life-cycle costs, vandalism
- safety - non-slip flooring, flame/smoke retardant or noncombustible surfaces
- quality appearance appropriate to MBTA gateway station

Vehicle Access

MBTA

- MBTA service vehicles (fare collection, station maintenance, trash removal, unit substation, traction paver substation access), MBTA police
- no parking for patrons to be provided; passenger pickup/drop-off (kiss and ride) may be considered
- assume MBTA accessibility van service (The Ride) will use other Blue Line stations with kiss & ride (i.e., Wood Island Station) for community service, and will provide service directly to Logan terminals for airport passengers

Massport Bus

- based on interagency agreement, MPA requests 10 bus bays at 55'; MPA to run right side loading buses on estimated 6 minute headways
- wheelchair accessibility to be addressed by Massport as required
- drop-off and pickup locations separated
- rental car vans/ hotel shuttles - limited to two bus bays dedicated to variety of users per Massport, with Urban Ring shared usage

Codes and Standards

- MBTA current standards
- Blue Line design standards
- Major Codes - MA State Building Code (6th Edition, effective February 28, 1997), NFPA 130 (Fixed Guideway Transit Systems)
- Full accessibility required: MAAB, ADAAG, MBTA Guide to Access

Constructability

- maintain full track service
- possible weekend shutdowns to be considered if required
- coordination required with CA/T construction /Blue Line track relocation
- demolition of existing station to follow completion of new station
- partial early interim opening of station to be considered if required to accommodate CA/T construction schedule

Engineering Design Criteria

Track Clearance/Geometry Criteria

- 18'-6" clear from top of rail within the station for catenary wires
- 3'-3 1/4" from top of rail to finished floor of platform.
- assume no overall floor slope within station, finished floor elevation +20.42' (MBTA datum)
- platforms located along tangent track, but sloping slightly from west to east

Traction Power and Primary Station Power

- station program to include a unit substation to transform 13.8kV power from MBTA electrical substation
- Blue Line traction power located at existing MBTA electrical substation located nearby

Signals

- Blue Line track relocation project includes design and construction of two new Central Instrument Houses.
- communications room to house racks for CCTV, fiber optics, telephone, public address system, radio repeater
- Airport Station signal work will require relocation of the existing signal cases/signals when the existing station is demolished, and protection of the new third rail crossover to be installed

Station Mechanical/Electrical/Lighting

- Exterior bus platform and plazas to be fully lighted
- Inbound entry to include exterior lighting
- Electrical room within station to house only electrical panels; small electrical transformer separate from unit substation
- Only specified areas within the station to be heated/cooled

Regulatory Review

Environmental Review

The relocated station and bus loop are included in the Central Artery/Tunnel Project East Boston Area Notice of Project Change approved by MEPA on 13 May 1998. Where feasible, CA/T Project commitments will be incorporated into the Airport Station design and construction.

Building Code Analysis

The MBTA's Airport Station, considered a passenger station on a fixed guideway transit system, must conform with National Fire Protection Association (NFPA) 130, Standard for Fixed Guideway Transit Systems. Code issues not specifically or completely covered or referenced in NFPA 130 are governed by the Massachusetts State Building Code (MSBC 6th Edition, effective February 1997) and other State rules, regulations, and standards. The MBTA Fire Protection and Life Safety Program, and the MBTA Standards and Design Guidelines including the referenced standards, supplement the NFPA 130 and MSBC documents, and provide additional technical requirements for MBTA systems.

Accessibility requirements must conform with the Massachusetts Architectural Access Board (MAAB) regulations, Uniform Federal Accessibility Standards (UFAS), and with the Americans with Disabilities Act - Accessibility Guidelines (ADAAG). The MBTA Guide to Access (MBTA - GA) is a supplemental reference manual for accessibility design.

The initial review of the MSBC established the Use Group Classification for the station as A-3, Assembly, per section 302.1 and 303.4. The latest edition (sixth edition, effective February 28, 1997) of MSBC requires all A3 occupancies with greater than 12,000 square feet in area to have a fire suppression system throughout the building, as per section 904.2. NFPA dictates that the building construction for all new transit stations be either Type I or Type II (noncombustible construction), or a combination of the two. The station is considered a one-story building with a mezzanine, with an approximate applicable area of 27,000 square feet, including the train

platforms (MSBC section 505.1 states that the area of a mezzanine does not contribute to the applicable area of the building). Using this area calculation as a basis, and allowable increases from MSBC section 506.2, Table 503 defines the allowable construction classifications as 1A, 1B, 2A, 2B, 2C. MSBC dictates maximum allowable egress distance as 250 feet with a fire suppression system.

NFPA requires the following fire separations for specific program spaces:

- Power Substations: 3 hour separation from all occupancies with 3 hour fire door
- Electrical Rooms: 2 hour separation from all occupancies with 1 1/2 hour fire door
- Battery Rooms: 2 hour separation from all occupancies with 1 1/2 hour fire door
- Trash Rooms: 2 hour separation from all occupancies with 1 1/2 hour fire door
- All public areas: 2 hour separation from all non-public areas

Additional detailed code review will be performed in the following phases of the design, and will be reviewed with the MBTA and the applicable regulatory agencies.

Regulatory Agency Roles

The regulatory requirements for design, construction, and occupancy of the MBTA Airport Station are reviewed and enforced by the following local and state officials:

1. **Department of Public Safety (DPS):** Enforces the requirements of MSBC, NFPA 130, MAAB, and all referenced standards included within these publications.

2. **Board of State Examiners of Plumbers and Gas Fitters (Plumbing Board):** Enforces the State Plumbing Code requirements.

3. **Board of Elevator Regulation:** Enforces the State Elevator Regulations and ANSI A17.1 requirements.

4. **Boston Fire Department (BFD):** Enforces the State Fire Prevention Regulation and fire fighting provisions during construction and occupancy.

Site/Civil Design

Based upon the information obtained to date there are a number of utilities within the Project Limit. These include the following:

- 24 inch storm drain that crosses the Blue Line tracks as two 27 inch pipes.
- various sized water pipes including one 20 inch and two 12 inch lines.
- various sized local storm drains which include catch basins, manholes and piping.

The site/civil work would be similar for all three conceptual design schemes. Site grading will be coordinated with the existing grades and the grades proposed as part of the CA/T Project. Water, both domestic and fire protection, storm drainage and sanitary systems will be designed to tie into the proposed station and then connect to the surrounding utilities. Based upon a review of CA/T Utility Drawings to date, the location of the sanitary sewer connection is not defined. It may be necessary to pump the flow.

The work proposed by the CA/T Project and any Massport projects will require extensive coordination to ensure compatibility of the projects. This applies to the interim phases of construction as well as the final completed state. The CA/T Project drawings show several existing utilities on the new station site as being abandoned and relocated. When CA/T phasing drawings are available, the construction sequencing of

the new station and the CA/T Project will require careful coordination. Depending on the sequencing, the new station will be tied into existing utilities to remain, new utilities already constructed by the CA/T Project, or new utilities designed by the CAT but built under the station contract.

Geotechnical Engineering

Background

The track area of the new station is included as part of the Blue Line Relocation Project in which, in general terms, the curve before the Prescott Street Underpass is straightened to give a straight run between the existing Airport Station and the Underpass. The rail alignment and elevation at the proposed station area will be relatively unchanged.

The proposed station will be two stories high, with ground floor at platform grade, which is about 3 feet above top of rail. The three schemes described above under **Architectural Design** are relatively similar in terms of structure size and location. The recommended solution is Scheme B, in which:

- bus platform canopy is separately supported from the main building structure and is supported on columns at about 25 feet on center,
- perimeter columns in the two-story station area are at about 25 feet on center with column dead loads (DL) from 65 to 140 kips and column snow loads (SL) from 15 to 35 kips,
- three interior columns in the two-story station area are long spans (70 to 90 feet) supporting a significant roof truss with column dead loads (DL) from 450 to 650 kips and column snow loads (SL) from 90 to 200 kips,
- train platform canopy is supported on columns at about 25 feet spacing on north and south sides of the double track. Canopy column loads are unavailable at this time. Platforms are typically precast T-beams with long spans, and
- all of the above column loads are presently planned to be supported of driven piles with concrete pile caps and grade beams.

To achieve platform grade in the station building and sloping down to existing grades within about 100 feet of the building, a raise-in-grade (RIG) will be required up to about four feet from existing grades.

Subsurface Conditions

Specific geotechnical explorations and laboratory analyses have not been performed for the proposed Airport Station. However, borings have been performed in the station area by the CA/T Project. Geotechnical engineering data contained in the CA/T Project Area Geotechnical Consultant Final Data Report on Contract D008A, prepared by Haley and Aldrich of Cambridge, Massachusetts, dated March 1996 has been reviewed. Based on the borings performed within about 100 feet of the proposed station, the two attached cross sections showing subsurface conditions were prepared. A simplified plan showing the station area, the borings and the cross-section lines is also attached. Logs of the borings (EB6-37, EB6-36, EB6-34, EB6-48-OW, EB6-47, EB6-27, EB6-32-OW, EB6-33, EB6-47, EB6-49 and EB6-50) are available.

Borings indicate the following subsurface conditions:

- about 10 feet of miscellaneous fill, over
- an intermittent layer of about 0 to 5 feet of Organic Silt, over
- up to 10 feet of sand, over
- up to 10 feet of silt, over
- marine clay (Boston Blue Clay) with top of stratum at approximate elevation 75 to 80 feet (CA/T datum) or about 30 to 35 feet below existing grade, over
- glacial till, with top of stratum at about elevation -20 to -40 (CA/T datum) or about 130 to 150 feet below existing grades, over
- bedrock at about 170 to 210 feet below existing grades.

A survey of existing manhole rims and ground surface elevations from the boring logs in the station area indicate that the ground surface varies from about elevation 115 to 117 feet (MBTA datum; CA/T datum +5.62 feet).

Geotechnical Implications

Slab Support: A raise-in-grade (RIG) of up to 4 feet over the approximate station area plus about 100 feet beyond on south, east and west sides will likely induce approximately 4 to 8 inches of surface settlement due to the increased loading on the compressible organic silt and clay strata. It is estimated that primary settlement of the organic silt (about 1 to 2 inches) will occur during construction (within one month of load application) and primary settlement of the clay layer will occur over several years. In addition, secondary settlement (which is not load related) will likely occur at a rate of 1/4-inch per year over an additional several years.

Based on the estimated settlement, a structural slab will be necessary for the station.

Potential methods to limit the load increase and its effects from a RIG include:

- place lightweight fill where the unit weight is between 1/3 and 1/2 the unit weight of regular soil
- place a soil surcharge significantly greater than the RIG to preload the compressible strata and limit RIG-related settlement
- support structural slab form work on temporary columns, leaving a crawl space beneath the slab. Ramping up to the outside of the building could also be supported on a structural slab where RIG is greater than 2 feet.

Building Foundation Support: The existing fill and organic silt are not suitable for support of the structure.

Support for the lightly loaded bus canopy and lightly loaded station columns is potentially possible by drilled cast-in-place concrete caissons bearing in the sand, silt or clay directly below the organic silt stratum. However, concrete caissons may experience post construction settlement of up to about an inch due to consolidation of the underlying thick deposit of clay. Further, bearing capacity of the clay is inadequate for the larger central column loads and some of the higher loaded perimeter column loads using conventional caisson sizes. A dual foundation system in the station (piles and caissons) may lead to unacceptable differential settlement, and is therefore not recommended.

Therefore, the preliminary recommendation is that station and bus canopy foundation support be provided by driven piles bearing in the very dense glacial till underlying the clay at a depth of approximately 130 to 150 feet below existing grade.

Typically the most cost efficient driven pile type is 14 or 16 inch precast prestressed

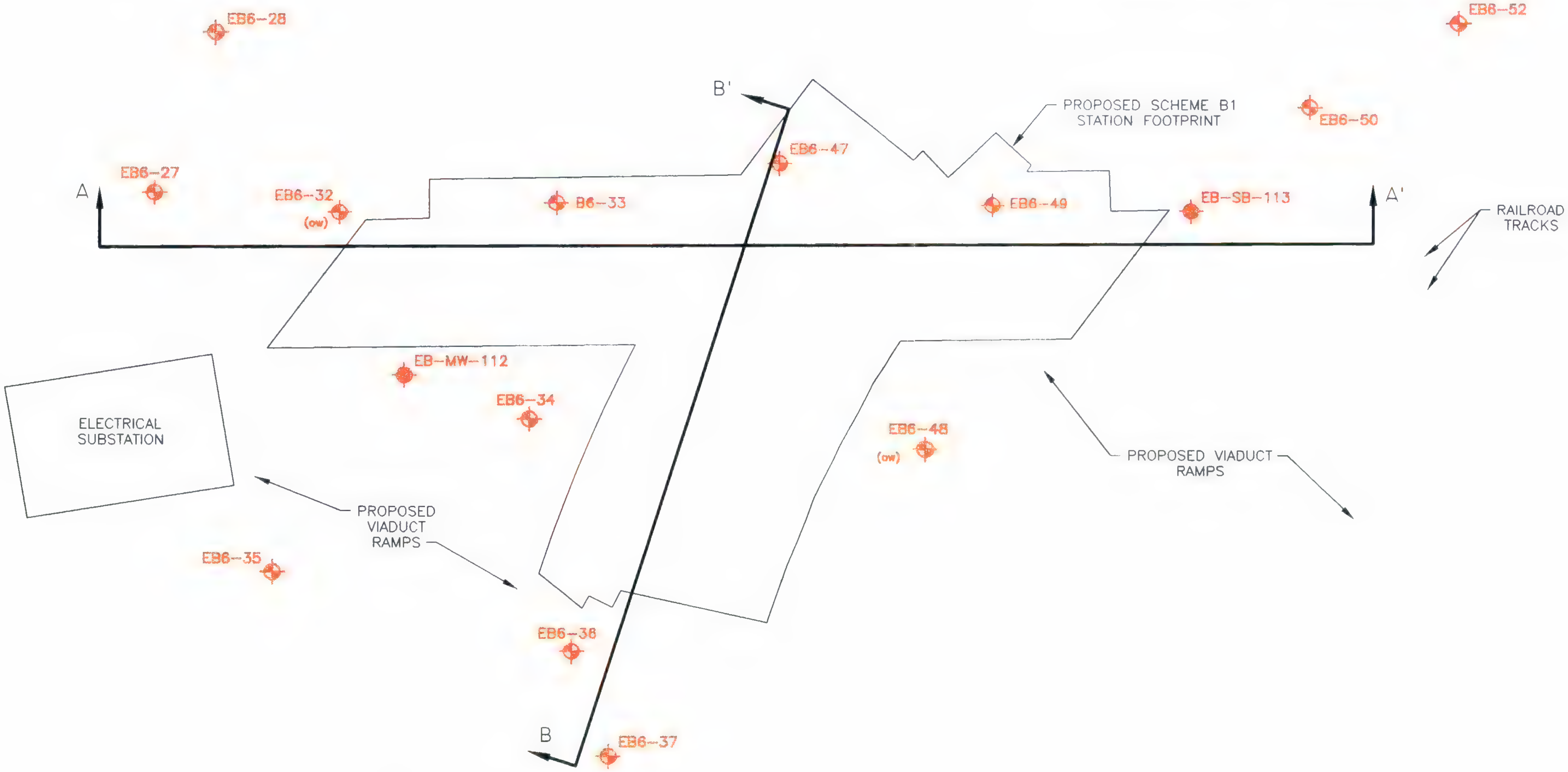
LEGEND:

- GEOTECHNICAL BORINGS FROM H&A REPORT
  - (ow) INDICATES MONITORING WELL INSTALLED
- ENVIRONMENTAL BORINGS FROM CDM REPORT

NOTES:

1. BASE MAP DEVELOPED FROM PLAN ENTITLED "MASSACHUSETTS BAY TRANSPORTATION AUTHORITY, AIRPORT STATION (E. BOSTON, MA.) – SCHEME A FLOOR PLAN LOWER LEVEL" BY WALLACE, FLOYD, ASSOCIATES, INC., DATED APRIL 24, 1998, SCALE: 1"=50'.
2. BORING LOCATIONS DETERMINED FROM THE FOLLOWING REPORTS:
   A. FINAL GEOTECHNICAL DATA REPORT, CENTRAL ARTERY (I-93)/ TUNNEL (I-90) PROJECTS, DESIGN SECTION-D008A (BOSTON, MA), VOLUME I OF II, BY HALEY & ALDRICH, INC. (H&A), DATED MARCH 1996.
   B. CHARACTERIZATION REPORT, AIRPORT ROUTE 1A INTERCHANGE, DESIGN PACKAGE D008A, CENTRAL ARTERY/TUNNEL PROJECT BY CAMP, DRESSER & McKEE (CDM), DATED NOVEMBER 1996.
3. FOOTPRINT OF PROPOSED STATION DEVELOPED FROM PLAN ENTITLED "MASSACHUSETTS BAY TRANSPORTATION AUTHORITY, AIRPORT STATION (EAST BOSTON, MA.) – SCHEME B1, FLOOR PLAN LOWER LEVEL" BY WALLACE, FLOYD ASSOCIATES, INC., DATED MAY 12, 1998, APPROXIMATE SCALE: 1"=40'.

PROJECT NORTH



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Airport Station
MBTA
East Boston, MA

Wallace, Floyd, Associates Inc.
Architecture
Landscape Architecture
Planning
Urban Design

Amman & Whitney
Structural

Weidlinger Associates
Structural

Bryant Associates
Survey/Civil

GZA GeoEnvironmental Inc.
Geotechnical Engineering

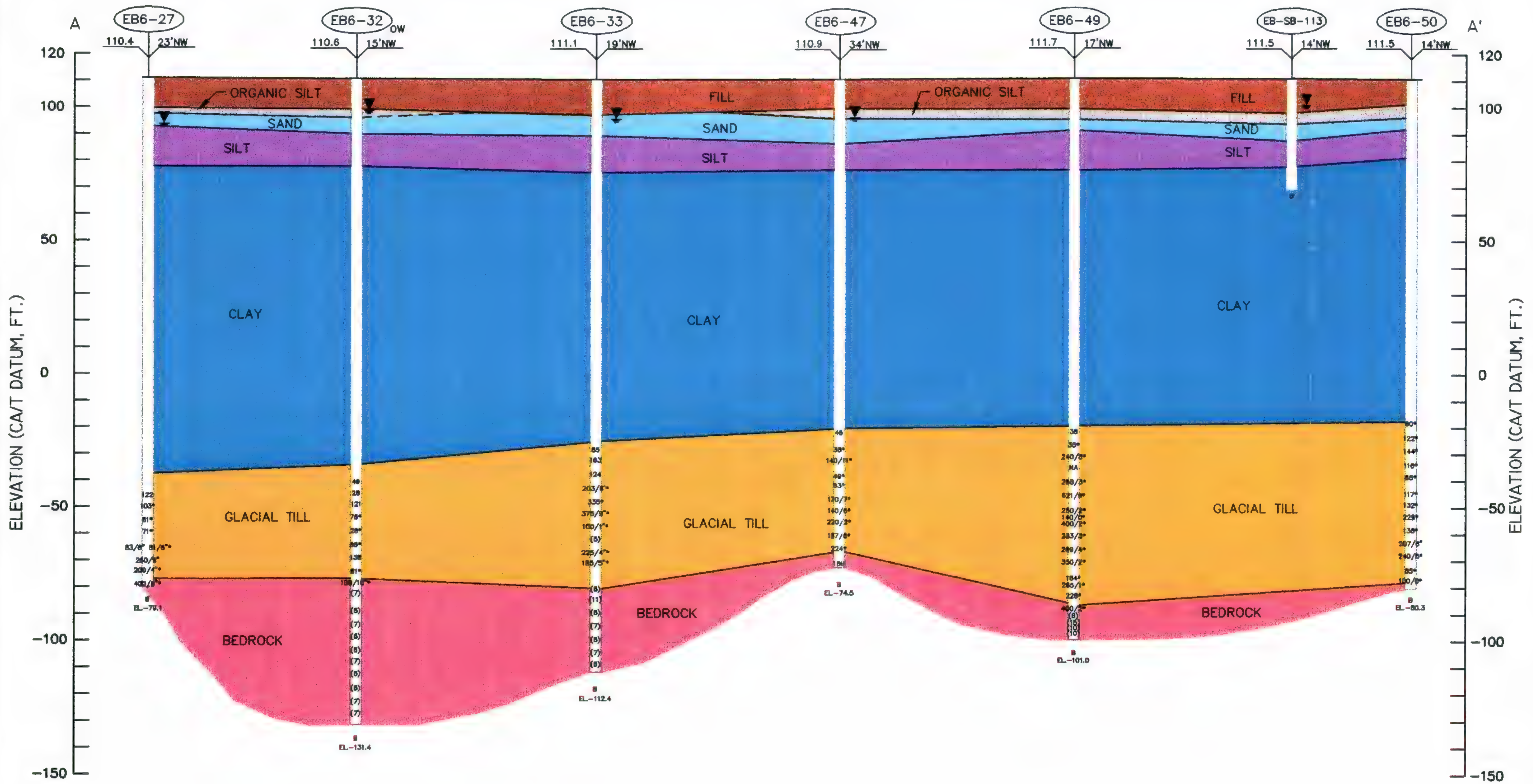
Migliassi/Jackson & Associates
Architectural Subconsultant

Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

EXPLORATION LOCATION PLAN

No.	Date	Revision

Job No.	15325.00
Drawn By:	JJP
Checked By:	–
Date:	27 MAY 1998
Scale:	1"=50'
Dwg. No.	



NOTES;

1. REFER TO SUBSURFACE PROFILE B-B' FOR NOTES AND LEGEND.
2. REFER TO EXPLORATION LOCATION PLAN FOR PROFILE LINE
3. CA/T DATUM = MBTA DATUM - 5.62 FEET

Airport Station
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East Boston, MA

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Geotechnical Engineering

Migliassi/Jackson & Associates
Architectural Subconsultant

Airport Station

Massachusetts Bay Transportation Authority

East Boston, Massachusetts

SUBSURFACE PROFILE A-A'

No.	Date	Revision

Job No. 15325.00

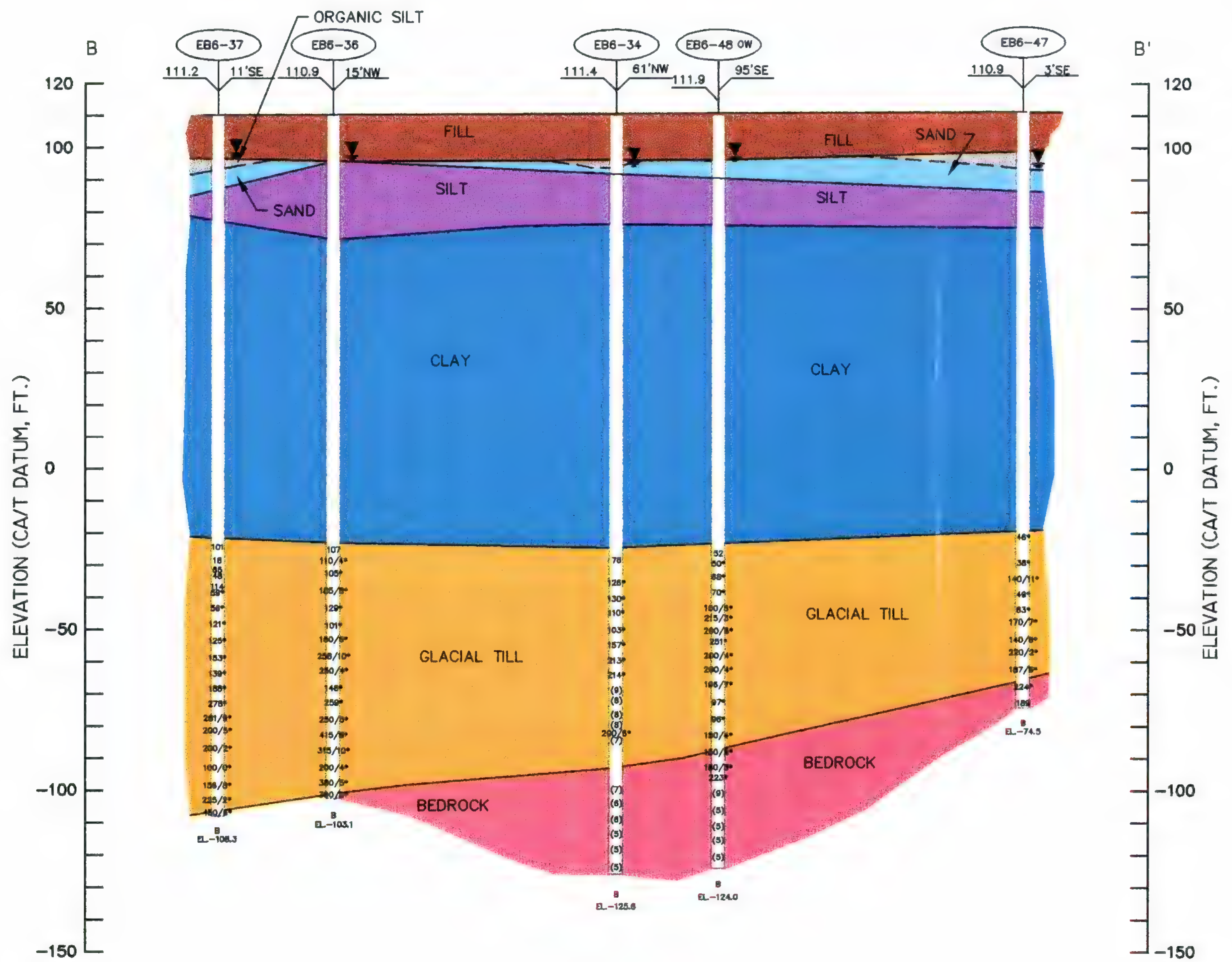
Drawn By: JJP

Checked By: -

Date: 27 MAY 1998

Scale: 1"=50'

Dwg. No.



NOTES:

1. NA = NOT AVAILABLE
2. REFER TO EXPLORATION LOCATION PLAN FOR PROFILE LINE
3. CA/T DATUM = MBTA DATUM - 5.62 FEET

LEGEND:

GZA-1 — BORING No.

123.2' — APPROXIMATE GROUND SURFACE ELEVATION AT BORING LOCATION

40'N — OFFSET DISTANCE FROM PROFILE TO BORING

23 — SPT N VALUE (BLOWS/FT.)

(7) — ROCK CORING PENETRATION RATE (MIN/FT)

85*/3" — * INDICATES BLOWS USING 300 LB. HAMMER FALLING 24"

B — INDICATES BOTTOM OF BORING

EL-112.4 — ELEVATION BORING WAS TERMINATED AT.

Airport Station
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Structural

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Architectural Subconsultant

Airport Station

Massachusetts Bay Transportation Authority

East Boston, Massachusetts

SUBSURFACE PROFILE B-B'

No. Date Revision	
Job No.	15325.00
Drawn By:	JJP
Checked By:	–
Date:	27 MAY 1998
Scale:	1"=50'
Dwg. No.	

PLOT DATE AND TIME: 1730 / 9 OCT 97 FILE NAME: 1BX00F03.DWG

piles, which is a displacement pile. Due to potential adjacent heave problems during driving of displacement piles it is recommended that piles be preaugered well into the clay stratum. Typical pile loads for 14 and 16 inch piles are 120 and 160 tons, respectively. The preliminary estimate of downdrag loads to the piles resulting from consolidation settlement due to the RIG is on the order of 50 tons per pile. Downdrag loads may be reduced by slip coating the piles; however, experience shows that adding additional piles to compensate for the downdrag is often more cost efficient.

Loads at the central columns are large enough that feasibility of pile support may be marginal due to limits on pile group size and the lack of pile capacity for structure loads once downdrag loads are subtracted. An alternative for these high load columns is caissons to glacial till/bedrock drilled in a slurry medium.

Raise-in-Grade (RIG): A 4-foot RIG using regular soil in the general station area is problematical for a number of reasons:

- RIG will cause surface and utility settlement
- RIG will add downdrag loads to piles, leaving less pile capacity to accommodate structural loads
- RIG will cause track settlement; magnitude of settlement depends on proximity of RIG to tracks.

Track Support: Track settlement caused by the proposed RIG may be mitigated by:

- keeping RIG away from the track area
- supporting the tracks on piles to glacial till
- monitoring track settlement and periodically re-ballasting the track based on observed settlement.

Recommendations

This analysis results in the following preliminary recommendations:

1. Further study is necessary to assess the costs and benefits of alternatives to the proposed raise-in-grade of up to 4 feet.

2. It is anticipated that an additional 30 percent in the number of piles, above the piles required to support structural and live loads alone, will be required to account for downdrag loads due to the proposed RIG.

3. Building loads should be supported by driven piles bearing in the glacial till about 150 feet below grade. Slab loads should be supported by a structural slab bearing on column piles and intermediate slab piles.

4. Further analyses of soil conditions and foundation type will be required to finalize recommendations.

Environmental Engineering

Excavation will be required to reroute utilities and accommodate pile caps and grade beams. It is anticipated that excavation in general will likely be less than 5 feet.

Subsurface Conditions

Specific environmental explorations and chemical testing has not been performed for the proposed Airport Station. However, environmental borings have been performed in

the station area by the CA/T Project. Environmental data contained in the CA/T Project Characterization Report; Airport/Route 1A Interchange; Design Package D008A, prepared by Camp Dresser & McKee of Cambridge, Massachusetts, dated November 1996 has been reviewed. A simplified plan showing the station area and the boring locations is attached. Logs of the borings (EB-MW-112 and EB-SB-112) are available. A boring log of QF-MW-145 was not available.

Environmental Data

1. Cortell Associates prepared a report entitled "Soil Characterization Report, Central Artery (I-93) Third Harbor Tunnel Project," in May, 1989. Data from this report indicate that in the track relocation area Total Petroleum Hydrocarbons (TPH) and heavy metals are at concentrations significantly above the 75th percentile for CA/T project wide soils.

2. Exceedences of CA/T characteristic fill soil concentrations are outlined in **Table 3.3** from the CA/T report. Review of the table shows exceedences in metals and TPH. Concentration ranges (parts per million) of willow samples from the aforementioned borings and shown on the Table 3.3 are:

- Cadmium 2.5 - 4.5
- Chromium 25 - 34
- Copper 130 - 430
- Nickel 28 - 43
- Zinc 360 - 1,100
- Lead 480 - 1,700
- TPH 460 -3,400

Based on the aforementioned data it appears the contaminants of concern during the track relocation construction will be metals and TPH in willow fill soils. Project specifications may require stockpiling of excavated fill soils for sampling and chemical testing for Volatile Organic Compounds (VOCs), Polynuclear Aromatic Hydrocarbons (PAHs,) metals and TPH. The subsequent off-site disposal method would depend on the testing results.

Based on the existing data, the mainly TPH contaminated soil may be disposed of typically at Massachusetts lined landfills or certified hot mix asphalt plants, according to criteria recommended by the Massachusetts Department of Environmental Protection (DEP) (see attached table). With regard to the metals data, it is not expected that RCRA (Federal Resource Conservation and Recovery Act) waste will be encountered on this project.

With a proposed raise in grade in the station area it is anticipated that the extent of excavation into existing soils will be limited. Hence, disposal volume may be as low as about 1,000 cubic yards.

CDM:Environmental Data Manager 11/12/96
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TABLE 3-3(Continued)

CENTRAL ARTERY - D008A
ANALYTICAL RESULTS EXCEEDING CHARACTERISTIC FILL
SOIL CONCENTRATIONS

Location ID	Sample ID	Sample Type	Sample Depth	Material Type	Parameter	Criteria	Sample Concentration
EB-97	EB-SB-97-003	UD	10'-12'	COSVFILL	TPH	380.0	720.0
EB-97	EB-SB-97-UC	UC	10"-17'	COSVFILL	Cadmium	1.8	3.4
					Silver	1.6	5.3
					TPH	380.0	400.0
EB-99	EB-SB-99-001	UD	7"-2'7"	GRANFILL	TPH	380.0	483.0
EB-105	EB-SB-105-001	UD	1'-3'	GRANFILL	TPH	380.0	1500.0
EB-108	EB-SB-108-001	UD	1'-3'	MISCFILL	Cadmium	1.8	4.1
					Chromium	22.0	41.0
					Copper	102.0	210.0
					Lead	426.0	750.0
					Mercury	1.4	2.9
					Nickel	27.0	36.0
					Zinc	288.0	770.0
					TPH	380.0	2300.0
EB-108	EB-SB-108-UC	UC	5'-27'	MARNDEPS/MISCFI	Beryllium	0.6	0.7
					Cadmium	1.8	2.1
					Chromium	22.0	34.0
					Copper	102.0	490.0
					Nickel	27.0	31.0
					Zinc	288.0	430.0
					TPH	380.0	380.0
EB-112	EB-SB-112-001	UD	1'-3'	GRANFILL	Cadmium	1.8	2.5
					Copper	102.0	200.0
					Lead	426.0	880.0
					Mercury	1.4	2.6
					Zinc	288.0	700.0
					TPH	380.0	460.0
EB-112	EB-SB-112-UC	UC	5'-27'	GLMNDEPS	Chromium	22.0	30.0
					Nickel	27.0	28.0
					TPH	380.0	620.0
EB-113	EB-SB-113-001	UD	1'-3'	GRANFILL	Cadmium	1.8	4.5
					Chromium	22.0	34.0
					Copper	102.0	430.0
					Lead	426.0	1700.0
					Mercury	1.4	2.8
					Nickel	27.0	43.0
					Zinc	288.0	1100.0
					TPH	380.0	3400.0
EB-113	EB-SB-113-UC	UC	5'-32'	GRANFILL/MARNDE	Cadmium	1.8	2.2
					Chromium	22.0	25.0
					Copper	102.0	130.0
					Lead	426.0	480.0
					Mercury	1.4	1.8
					Nickel	27.0	33.0
					Zinc	288.0	360.0
					TPH	380.0	660.0
EB-115	EB-SB-115-001	UD	1'-3'	MISCFILL	TPH	380.0	1500.0

NOTES:Units(mg/kg)

CONTAMINANT	Reuse Levels (mg/kg)[a]	
	Lined Landfills	Unlined Landfill
Total Arsenic	40	40
Total Cadmium	80	30
Total Chromium	1,000	1,000
Total Lead	2,000	1,000
Total Mercury	10	10
Total Petroleum Hydrocarbons (TPH)	5,000	2,500
Total PCBs[b]	< 2	< 2
Total SVOCs[c]	100	100
Total VOCs[d]	10	4
Conductivity[e] (umhos/cm)	8,000 umhos/cm	4,000 umhos/cm
Listed or Characteristic Hazardous Waste (TCLP)[f]	NONE	NONE

TABLE 1 NOTES:

a **The reuse levels are expressed as total levels in mg/kg and apply to reuse of soil as daily cover, intermediate cover, and pre-capping contour material at lined landfills and unlined landfills as described in this Policy.**
b **Total concentrations of polychlorinated biphenyls EPA Method 8080.**
c **Total concentrations of compounds listed in EPA Method 8270.**
d **Total concentration of compounds listed in EPA Method 8260.**
e **For soil which may be expected to contain elevated NaCl.**
f **TCLP testing shall be performed for metals or organic compounds when the total concentrations in the soil are above the theoretical levels at which the TCLP criteria may be exceeded. For guidance parties shall consult United States Environmental Protection Agency, Memorandum #36, "Notes on RCRA Methods and QA Activities", pp. 19-21, Gail Hanson, January 12, 1993.**

[Please note that the methods specified in footnotes d, e, and f indicate the universe of chemicals to be added up in calculating the total concentrations for these classes of contaminants. Section 5.0 of this Policy provides guidance for determining which specific chemicals must be considered chemicals of concern (e.g., contaminants) within the soil. This Policy does not specify the analytical test methods to be used to quantify the specific contaminants. Readers can consult 310 CMR 40.0017 <u>Environmental Sample Collection and Analysis</u>, 310 CMR 30.110 <u>Criteria, Procedures for Determining Which Wastes are to be Regulated as Hazardous Waste or Non-Hazardous Waste</u> and 310 CMR 30.151 <u>Representative Sampling Methods</u> for additional information which may be applicable to the selection of appropriate sampling and analytical methods.]

FROM MASS. DEP POLICY # COMM-97-001

Structural Design

Concourse Structure

Since the concourse roof is proposed as a long span structure, it presents perhaps the greatest structural opportunity and challenge in the design of this station facility. To ensure that the appropriate structural solution would be found, a large number of options using various materials and structural systems have been explored. Roof materials investigated included Teflon coated fabric, concrete and steel. Structural systems included cable supported tensile fabric membranes with the supporting roof structure exposed above the roof, rigid frames, conventional steel framing, and various truss configurations located both above the roof and within the building envelope.

Based on architectural and structural considerations as well as constructability, this process of exploration led to two viable options for the structural system of the concourse roof system:

- Double Truss System
- Spine Truss System

Double Truss System

The double truss system reflects the fact that the roof of the concourse consists of two distinct halves, each flowing in its own direction. For this reason each half is supported by its own long span truss. One of the two similar trusses is illustrated in Figures 4 and 5.

The main component of the double truss system is a rectangular truss located along the centerline of each roof. Each of the longitudinal trusses is supported on three column supports located along the centerline of the trusses. The columns could be either cylindrical concrete or tubular trusses to accommodate elevator shafts or other building program elements. The two main spans are roughly 90 feet long and the truss cantilevers past the exterior supports roughly 20 feet at each end.

For conceptual design purposes, the trusses taper vertically from 8 feet at the wide end of the roof to 5 feet at the narrow end. The transverse dimension is a constant 8 feet to provide lateral stability. The main truss chords were analyzed as 6 inch diameter steel pipe and the bracing elements were 4 inch diameter pipe. The final dimensions of the truss, including sizing of truss members, will need to be verified during design development.

The roof is supported by triangular wing-like structures cantilevering out from the longitudinal trusses. These "wings" are 8 feet wide and are spaced at 20 feet on center. They vary in length as the roof width tapers.

Gravity loads are resisted by the main component of the truss. Transverse loads are resisted solely by the three supports. The exterior walls provide no vertical or horizontal support of the roof. This enables the perimeter walls to be lighter in nature. The three vertical piers supporting each truss provide the lateral stability for the roof system, and therefore, no additional external lateral bracing is required.

The skylight between the two roof structures will be hung from the edges of the wings. This connection must allow for the relative displacements of the two roofs due to wind, seismic and asymmetric snow loading. These relative displacements, which may be up to several inches in magnitude, can be accommodated using an articulated

skylight support system as shown in Figure 4. Lateral displacements as well as vertical displacements of the wings due to rotation of the roof can be reduced by locating small columns along the perimeter walls. The final design of the skylight structure will dictate if these additional columns are required.

Spine Truss System

The Spine Truss System is designed to integrate the two halves of the building into one structural unit by supporting the two sections of the roof by a single truss. The aesthetics demanded by the architecture results in a dynamic form. In order to achieve a simple and economical design, the truss geometry follows rigorous rules. A schematic plan and typical sections of the spine truss are shown on Figure 1. The chords will be arcs of circles. The twisting effect results from interconnecting Plane A (see Figure 1) with the two sections of the roof and by rotating Planes B and C 90° as the truss traverses the full length from one end to the other. The triangular space truss is supported at three points. By providing a support along the spine of the roof, the spans for all other roof elements become relatively small and can be framed by using light sections.

Since the truss supports at least one half of the roof load and therefore its strength needs to be substantial, it is logical to impose all the lateral loads (wind and seismic) onto the same element. Thus the truss not only provides vertical support for the roof, but also provides lateral stability for the entire concourse building envelope. Experience suggests that by combining the gravity and lateral load resisting mechanisms into a single element, this combination will lead to an efficient design. By virtue of the fact that lateral stability is achieved by the truss, the exterior walls can be framed with relatively light structural elements and can be entirely free of lateral braces.

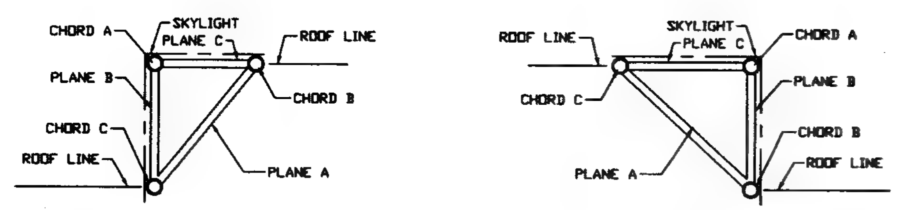
A conceptual level stress analysis concluded that the truss can be constructed of pipes with pipe diameters that vary from 8 inches to 16 inches. The three vertical supports may be concrete or steel and can take a large variety of forms. These vertical supports in turn will be supported on piles or caissons.

The detailing of the truss will be done by carefully considering constructability and maintenance issues. Current experience with the design of the elevated walkways at Logan Airport suggests that structural components, significantly larger than the proposed spine truss, can be shop fabricated and delivered to the site vicinity by barge. Erection of large span sections can then be done in very short time frames. If shop fabrication for the truss is feasible, it will significantly increase the speed of construction for the concourse building.

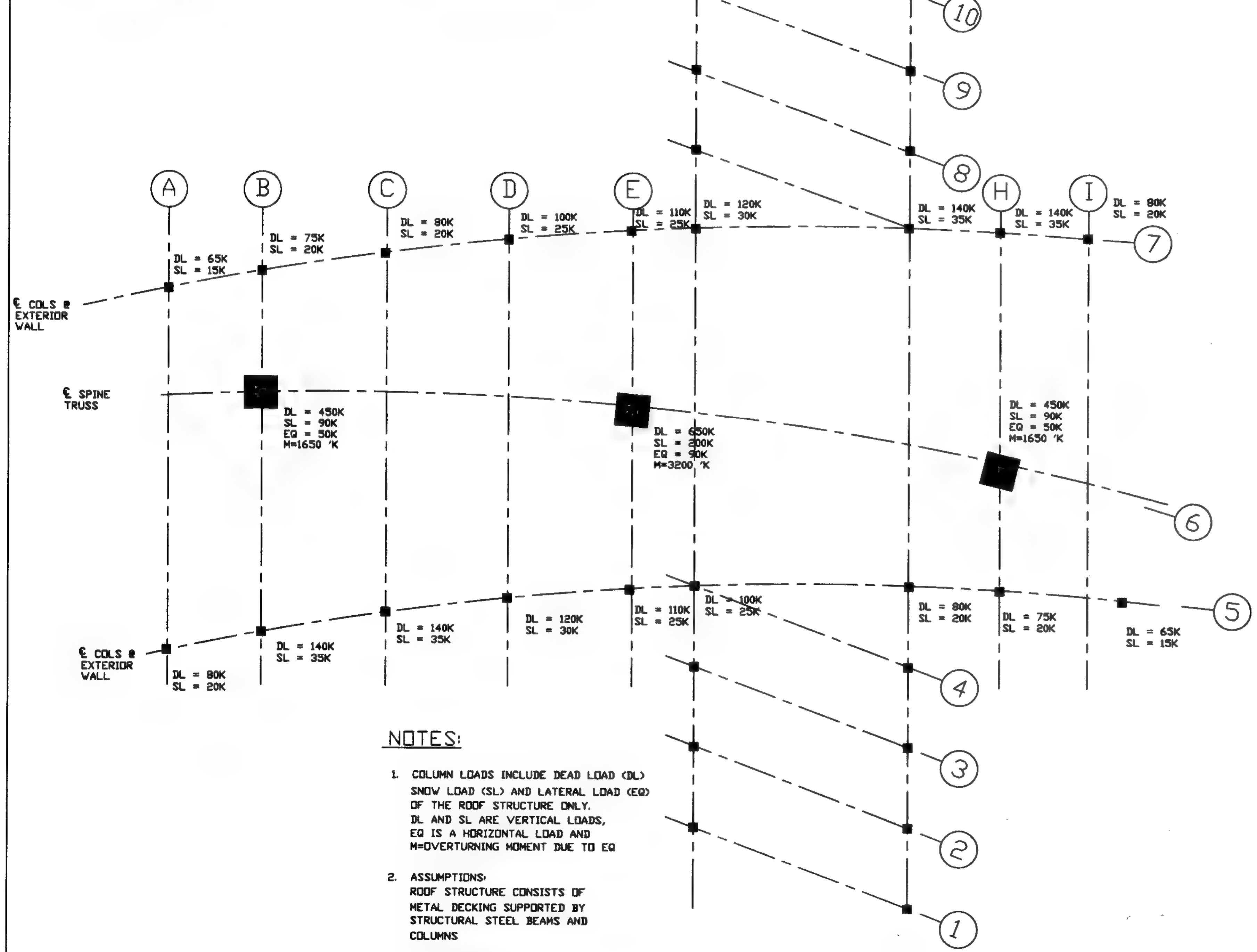
Since the concourse will not have a controlled climate, it is subject to temperature changes and therefore to thermal movements. In order to allow these movements to take place without generating high stresses, the structure of the concourse will be isolated from the structure of the platform canopy. This isolation takes place by the introduction of expansion joints which will also provide seismic separation between the two structures.

Internal Pedestrian Bridges

Separate paid and unpaid pedestrian crossover bridges are proposed within the station. The bridges will require a span of approximately 50 feet over the tracks and train platforms. Several structural systems were investigated, including suspending the



Section 1 **Section 2**



NOTES:

1. COLUMN LOADS INCLUDE DEAD LOAD (DL) SNOW LOAD (SL) AND LATERAL LOAD (EQ) OF THE ROOF STRUCTURE ONLY. DL AND SL ARE VERTICAL LOADS, EQ IS A HORIZONTAL LOAD AND M=OVERTURNING MOMENT DUE TO EQ
2. ASSUMPTIONS: ROOF STRUCTURE CONSISTS OF METAL DECKING SUPPORTED BY STRUCTURAL STEEL BEAMS AND COLUMNS
3. SPINE TRUSS SUPPORTED BY 8'X8' CONCRETE PIER

Figure 1

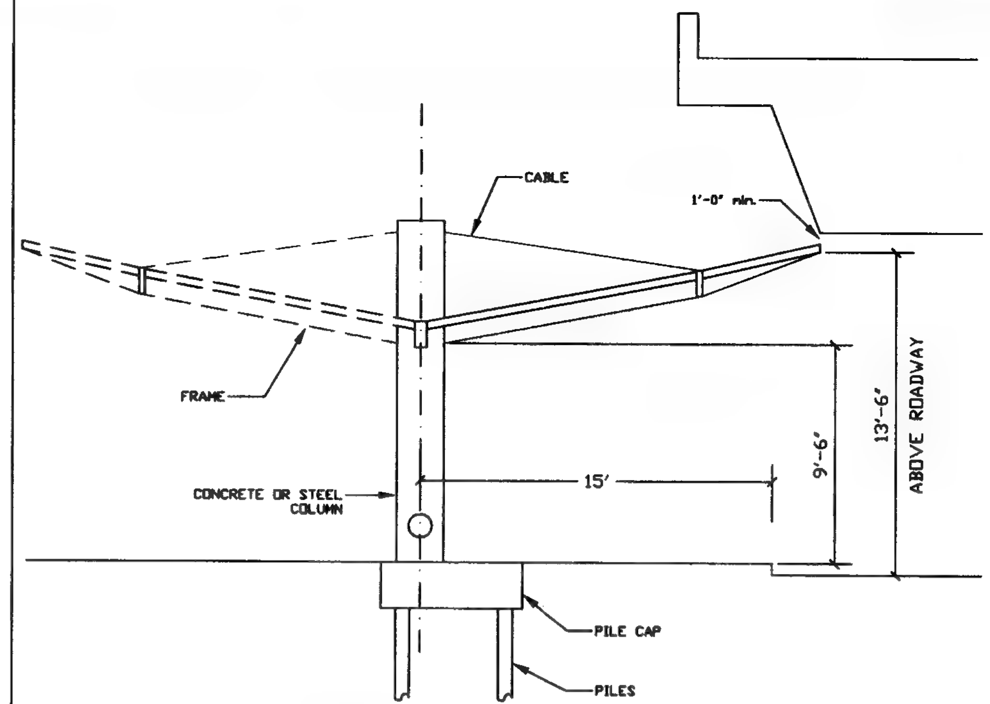


Figure 2

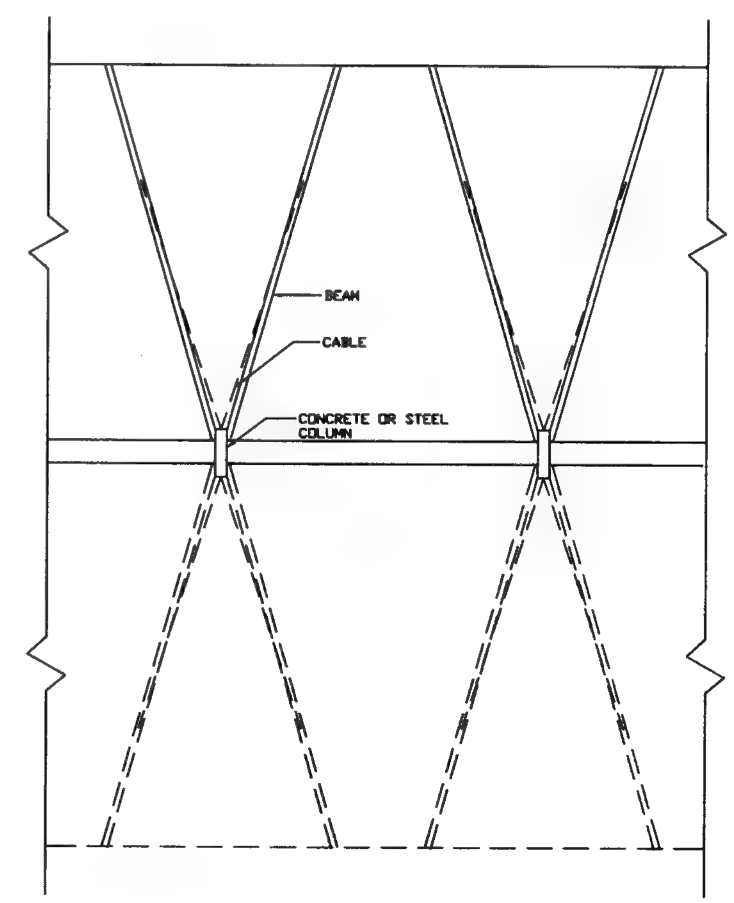


Figure 3

Airport Station
MBTA
East Boston, MA

Wallace, Floyd, Associates Inc.
Architecture
Landscape Architecture
Planning
Urban Design

Ammann & Whitney
Structural

Weidlinger Associates
Structural

Bryant Associates
Survey/Civil

GZA GeoEnvironmental Inc.
Geotechnical Engineering

Miguel Associates & Associates
Architectural Subconsultant

Airport Station
Massachusetts Bay Transportation Authority
East Boston, Massachusetts

Structural Diagrams
Scheme B
Figure X

Job No	14103
Drawn By	JR/TR/VA
Checked By	—
Date	27 MAY 1999
Name	
Dwg No	

PLOT DATE AND TIME: 17:00 / 28 May 1998 FILE PATH: P:\14103\DRAWINGS\REPORT\

bridges from the roof structures and supporting the bridges independently of the roofs. To minimize loading on the roofs, especially the lateral loads which would be induced by seismic loading, it was concluded that the most cost effective method is to keep the pedestrian bridges independent of the roof structures and support them from below.

Precast concrete members for the bridges were deemed to be appropriate for construction of the bridges to minimize construction impacts over the live tracks. In addition, the concrete material would offer an interesting contrast between the exposed steel roof structure and the pedestrian bridges below. A rigid frame or flat arch system might be appropriate to reflect the flat arch system of the track platform canopies.

Platform Structure

Both cast-in-place and precast concrete were considered for the construction of platform structures. With the presence of fills and compressible soils, grade beams supported by a deep foundation system consisting of piles will be required to support the platforms.

The choice of precast concrete elements for the platform, such as "double tees," is attractive from the perspective of constructability. These elements will facilitate quick field erection and preclude potential disruption to the MBTA service. The formwork required to construct cast-in-place concrete platforms would interfere with passing trains on the adjacent active tracks. The precast concrete elements would be covered with a concrete topping course and architectural floor finishes.

Platform and Bus Canopies

Various structural options have been explored for the design of the canopies. In order to properly analyze the alternatives from both the functional and cost points of view, in addition to the canopy configuration, their foundations needed to be considered as well. Due to the presence of unsuitable soils, the canopies need to be supported on deep pile foundations. It was found that the minimum feasible pile foundation provides a load carrying capacity which is quite substantial compared to the relatively light weight of the canopy structure. In order to make use of this large load carrying capacity, it is desirable to increase the distance between points of support. The large pile capacity may also allow the introduction of heavier concrete piers instead of light steel columns without imposing a penalty on the cost of the foundation. A concept that makes use of the larger span is presented on Figures 2 and 3.

Given the fact that the canopies will be supported on piles, consideration needs to be given to the treatment of the pilecaps at least for the bus canopy. It may become feasible to align the top of the pilecap with the sidewalk. By applying the appropriate pavement on the sidewalk and on the top of the pilecap, the differential settlement that is likely to be experienced by the sidewalk surface surrounding the canopy support may be handled in a straightforward fashion.

The treatment for the train canopies might be different from those for the buses due to the fact that in addition to the station canopies, the station platforms may also need pile supports.

Outstanding Issues

1. Impacts and sequencing of adjacent CA/T work.

2. Differential vertical and lateral displacements between the two concourse roof structures in the double truss system which affect the design of the skylight structure, and differential displacement between the concourse roofs and the platform canopies must be investigated further.

- Settlements due to proposed surcharges as well as downdrag forces on piles must be investigated.
- Locations of column supports must be coordinated with existing and proposed underground utilities and power duct banks.

Traction Power and Primary Station Power Design

In order to provide 13.8 kV power to the double-ended substation at the new Airport Station, a source of power is needed. At the existing Airport electrical substation there is not enough room to add two additional 15 kV cubicles to the existing switchgear. There is room for only one more cubicle and that should be utilized to bring another 15 kV cable from downtown Boston to Airport substation.

The present plan is to utilize the two existing breakers that feed the unit substation in the basement of the existing Airport electrical substation. One idea is to add two sets of 15 kV disconnect switches in the basement which would be fed from the "existing" unit substation ac breakers. Each set would have two 15 kV disconnect switches that would feed power to the unit substation at the existing electrical substation and a new unit substation at the new passenger station. The existing disconnect switches for the unit substation in the basement would have to be modified in order that fuses be added for protection of the existing electrical equipment.

For the passenger station, specifications and plans will be prepared for a double-ended unit substation and a Supervisory Control (SCADA) remote terminal that would be connected to the MBTA Central Control at High Street.

The ac and dc cables necessary to bring 13,800 ac power and 600 Volt dc power to the passenger station will be in conduit underground from the substation to the passenger station. These cable feeds will be coordinated with the new ac and dc cables and conduit for the Blue Line Track Relocation Project.

When the construction of the passenger station commences, the trains will be operating on the catenary which will be supported on temporary center columns under the Blue Line Track Relocation Project. When the station is put in service, the trains will be operating on the third rail and switching to or from the catenary at Airport Station. There will be pantograph detection systems installed at both inbound and outbound tracks and the catenary will be supported off the station train platform canopy structure.

With the modernization of the Blue Line stations along the entire line, additional ac power is required at each passenger station. The new Airport Station will have multiple escalators, elevators, unit substation, communication room, fare collection, etc., which will generate significant electrical loads.

The MBTA prefers to provide ac power to the passenger station from the 13.8 kV cable system because of the economical "bulk power" rate they have negotiated from Boston Edison. There is a tremendous cost savings at each location by buying "bulk" in South Boston and distributing the power over their own cable system. With the planned service upgrade to six-car operation in the future and additional ac loads from

Airport to Orient Heights, the existing ac cable system should be strengthened. The MBTA commissioned a study of their 13.8 kV cable system and their Engineer pointed out potential ac cable problems in East Boston and recommended that a new ac cable be added from downtown Boston to Airport substation. The ac cable from Boston would either be from Dewey substation, Aquarium or Lincoln Switching station and would travel to Airport via the Blue Line Tunnel with the existing ac cables. There is room to add a 15 kV cubicle and breaker at the existing Airport substation to receive this additional power. It is logical now to add this equipment and ac cable to ensure reliable ac and dc power for East Boston. At this time, this upgrade of Blue Line power is not included in either the Airport Station Project or the Blue Line Track Relocation Project.

Coordination of the Airport Station Project with the work of the Blue Line Track Relocation Project will be important. Some duplication with cable, conduit and catenary designs can be avoided by careful planning with respect to other events around the planned work area, including the design of the Blue Line Track Relocation Project. Coordinating the work effort of this project with the Central Artery Project is required since the CA/T will be constructing and demolishing the ramps around this project.

The new passenger station will be three to four feet higher than the existing grade and will impact the substation access and could also cause water runoff surrounding the substation. The substation must have pedestrian, car and truck access as it does today. Presently, there is a road next to the outbound station which terminates at the substation for access to and from the substation. The design team must provide a clear access path and provide new drainage around the substation to protect the equipment from water.

Electrical Systems Design

The electrical systems in the station are provided in conformance with Massachusetts Electrical Code, Building Code, NFPA, ADA, and MBTA standards.

Primary Service

The Primary Power Service to Airport Station will be provided from either the MBTA existing primary substation, or the local power company. Two new 13.8 KV cables run in 5" conduits to a new electrical room located in Airport Station will be provided to feed a new double ended substation. The 13.8 KV cables are impregnated paper insulated Type "H", lead covered to met the MBTA specifications.

Secondary Distribution

The new double ended unit substation consists of primary load interruption switches, a 750 KVA ventilated dry type transformer rated at 13.8 KV delta primary to 227/480 volt wye secondary and low voltage section with drawout air circuit breakers to feed each side of the substation. A normally open tie breaker interlocked with the secondary main breakers will be provided in the low voltage section to allow either transformer to be able to handle the total electrical load when an incoming breaker or cable is out of service. All drawout air circuitry breakers are provided with solid state trip devices and stored energy operating mechanism. Panelboards with bolt-on circuit breakers are provided for distribution of power to lighting, receptacle, and mechanical loads. Step-down 480 V to 120/208V dry type transformers are provided for 120 volt loads.

Emergency Generator System

An emergency generator will be provided. The fuel source for the generator has not been determined at this time. The generator operates automatically during the normal power outage and provides power to all life safety equipment, communications equipment, smoke evacuation system, etc. All these start sequentially.

The emergency generator system is provided with automatic transfer switches and distribution panel. All emergency equipment is located in a two hour-rated dedicated room.

Uninterruptable Power System (UPS)

In addition to the generator, a battery invertor system is provided to automatically maintain station emergency lighting during the interval when normal power fails and the generator starts. The invertor system is rated for a minimum of one and one half hours of operation. Invertor system equipment is located in a separate room.

Lighting

Lighting systems (normal and emergency) consist of fluorescent light sources. Platform fixtures are fluorescent, and lighting levels will conform to the following:

Areas	**Footcandles Maintained**
Administrative Staff Areas, Starter's Room, Fare Collection Booth, Communications Room, and Equipment Rooms	30
Concession Area	30
Emergency Lighting at Station Platforms,	4
Places of Egress, Stairways, and Exits Entrance Lobbies	30
Mechanical and Electrical Spaces	20
Outdoor Entrances to Escalators and Stairways	10
Pedestrian Tunnels and Passageways, Mezzanine Areas	40
Pedestrian Walkways	5
Stairways and Entrances	25
Station Platforms	20
Storage Rooms, Porter's Rooms	15
Toilets	30
Trackways and Tunnels (emergency and normal)	1.5
Waiting Areas:	
Interior	30
Exterior	15
Vending Area	40

Wiring Devices

For cleaning and maintenance equipment, vandalproof 110V AC convenience outlets will be provided at platforms, spaced about 50 feet on center. At mezzanines, a similar convenience outlet is wall mounted at each collection booth. A 110 volt outlet is provided in the utility rooms, porter, etc. Underfloor electric ducts are installed beneath the bank of turnstiles and to other locations of future automatic fare collection equipment. These ducts are used to feed collection booths and fare boxes and are installed in groups of three - one duct each for AC, DC, and signal wiring. Each of the three ducts are connected by conduit to the nearest electrical room. A large junction box is located at the termination of the duct system in each collection booth.

Public Address System

The Airport Station Address System provides for intelligible voice communication throughout the Transit Station.

Local paging can be initiated from the Collectors' Booths, the Inspectors' Room, and the Train Starters' Room by using a Public Address Control Box that is located in each of the rooms. Paging is also accomplished by the Loudspeaker Monitor Panel which is located inside the Public Address Cabinet in the Communications Room.

Electronic Sign System

The Electronic Sign System provides for distribution of passenger information via LED scrolling bulletin boards located throughout the Airport Station Lobby and Platform area. Each electronic sign displays messages developed and transmitted to a central station as determined by the MBTA.

MBTA Police Talk-Back Speaker System

The MBTA Police Talk-Back System provides voice communication with the MBTA Police Dispatcher at MBTA Headquarters at Cabot Yards. A passenger requiring assistance from the MBTA Police depresses the pushbutton on one of the "call boxes" located throughout the station. The Talk-Back System senses the request and notifies the Dispatcher.

Fire Alarm System

The Fire Alarm System is provided with an automatic and manual Class A closed circuit, local energy, and double supervised system with battery standby.

The system is provided with necessary hardware and software interface with existing computers to provide an overall functioning system.

Empty Conduit System

An empty conduit system will be provided for CCTV system and for Massport use.

Fire Protection Systems Design

780 CMR - Sixth Edition, 904.2, Use Group A-3

An automatic fire suppression system shall be provided throughout all portions of the building. The fire suppression systems shall be dry-type if passing through or serving

unheated portions of the building and are wet-type if serving heated portions of the building.

MBTA Guidelines and Standards

Standpipe System: A dry standpipe system will be installed at each station platform. Two (2), two and one-half (2-1/2") accessible standard pipe valves will be spaced at one hundred (100) foot intervals. A street-level siamese fire department connection will be provided to fill the standpipe system and will be as required by the local fire department. All connection points, both fill and draw-off, will be equipped with threads that conform to the standards of the local fire department.

FM200 - Agent Extinguishing Systems will be provided in Central Instrument Rooms (CIR), Emergency Control Rooms (ECR) and Communications Rooms.

Portable fire extinguishers will be provided in Electric Rooms, CIR, Communication Rooms, Starter's Rooms and Main Collector's Booths and as directed by the local fire department.

All fire suppression systems will comply with 780 CMR - Sixth Edition, 903.1.1 Fire Protection Construction Documents and related NFPA Articles.

Plumbing Systems Design

All plumbing systems, equipment and installation will comply with the Massachusetts State Building Code.

A complete plumbing design consisting of all required, State approved systems necessary for toilets, mechanical rooms and storm drainage systems will be provided.

Domestic and fire building service mains will have separate wet tap connections to the existing street water main.

Domestic Cold Water will be connected to each plumbing fixture and all equipment requiring cold water.

Domestic Hot Water will be connected to each plumbing fixture that requires hot water. Electric hot water heaters will be provided in close proximity to each toilet cluster.

The Sanitary Soil Waste and Vent System will be connected to each plumbing fixture and extend collection system to street main.

Storm Drainage System will be connected to all roof drains and the collection system will be extended to the street main.

Plumbing fixtures and related accessories will meet all requirements of the American Disabilities Act and MBTA Standards.

Heating, Ventilating and Air Conditioning Design

Electric Room Ventilation (Substation and Equipment Rooms, etc.)

The electric rooms will be ventilated with outdoor air. The airflow will be sized to

remove heat generated by the electrical equipment in order to maintain the maximum space temperature at 95 F. The outdoor air will be filtered. A thermostatically controlled electric unit heater will be provided to maintain the space at 60 F during the heating season.

Battery Room

The battery room will be ventilated to remove fumes at the rate of two air changes per hour. An electric unit heater will be provided to maintain the space at 60 F during the heating season.

Emergency Electric Room

Intake and discharge air louvers with motorized dampers will be provided to remove the heat from the generator's cooling radiator. An exhaust fan will be included, on a timer, to ventilate the space. An electric unit heater will be provided to maintain the space at 60 F during the heating season. Combustion air will be piped to the outside.

A natural gas or fuel oil system including main fuel storage, transfer pump and day tank will be provided for the emergency generator, as determined during later design stages.

Mechanical Spaces

A ventilation system, supply and exhaust, will be provided for each of the mechanical type spaces. The systems will be sized to remove heat and to provide the ventilation required by code. Thermostatically controlled electric unit heaters will be provided for each space to maintain the space temperature.

Fare Collection Booths

Stand-alone HVAC units will be provided for heating and cooling.

Staff Toilets

Mechanical ventilation, supply and exhaust, will be provided for the toilet areas. Electric baseboard radiation will be provided to maintain the required winter design temperature.

Porter's Room

The Porter's Room heating and ventilation will be sized to maintain the space at 50 F during the winter. The ventilation will be provided at the rate of .3 CFM/square foot of floor space. The heating coil in the H&V unit will be electric. The air will be filtered.

Concession Area Heating and Ventilation

The concession area heating and ventilation system will be sized to maintain the space temperature at 70 F during the winter. The heating coil will be electric. The ventilation rate will be equal to 12 air changes per hour. A separate exhaust system will be provided if required by a concession area tenant.

Police

A packaged DX air conditioning unit will be provided to maintain the police area at a maximum of 78 F during the cooling season. The air conditioning unit will include an electric heating coil and filters. The volume of outdoor air will be sized per code based on the number of occupants.

Elevator Machine Room

The elevator machine room will be heated and cooled as required by the State Elevator Code.

Communications Systems Design

The communications facilities at the existing Airport Station include a Fiber Optic Transmission System (FOTS), Public Address (PA) System, Closed Circuit Television (CCTV) System, Police Talk-Back System, Key Telephone Instruments with PBX/ Ringdown lines and other ancillary devices.

Construction of the new Airport Station will include a new Communications Equipment Room. Preliminary construction sequencing indicates that the new Airport Station will be constructed while the existing station remains in revenue operation. Upon completion of the new Airport Station, revenue service will be terminated at the existing station and will begin at the new station. Once revenue service has been completely terminated at the existing station, the station will be demolished.

Complete construction of the new Airport Station while the existing station remains in operation, along with the desire for a minimal cut-over schedule, will require careful consideration with regard to relocation of the existing communications systems. Existing communications equipment may be relocated to the new station where practical, or new communications equipment will be furnished and installed where necessary.

Communications Equipment Room

A new 280 sf Communications Equipment Room will be constructed at the new Airport Station. In order for this room to be ready for equipment installation prior to cut-over, new AC Power Distribution facilities, Fire Alarm/Intrusion Alarm System, lighting, HVAC, equipment racks, Station Distribution Frame, Protected Entrance Terminals and cable tray, similar to other MBTA Communication Equipment Rooms, will be furnished and installed. The construction of Communications Equipment Room is considered to be part of the station construction contract.

Fiber Optic Transmission System

Existing FOTS equipment, including multiplexers, channel banks, optical patch panels, VF and DS-1 cross-connects may be relocated from the existing communication room to the new communications room, and installed within EMI shielded cabinets. The FOTS may be relocated as the model of the existing multiplexer is no longer manufactured. FOTS DC power supply equipment, including battery charger, batteries, fuse panel and ring generator, may be relocated from the existing communications room to the new communications room, and installed within a new equipment rack. If required, relocation of existing equipment will be accomplished such that the FOTS remains in-service during MBTA operating hours. The relocated equipment will be terminated and tested. Further investigation will be required to determine the cost

effectiveness of relocating existing equipment versus providing new equipment.

Public Address System

As the existing PA system is reaching the end of its useful life, the Contractor will furnish, test and place in service a new ADA compliant Public Address and LED signage system at the new Airport Station. This will include all PA and LED electronics, PA speakers, LED signs, cabling and conduits, consistent with current MBTA standards.

Closed Circuit Television (CCTV) System

It is currently proposed that existing CCTV electronics, including video splitters, quad screen splitters, video switch and encoders be relocated from the existing communications room to the new communications room, and installed within an EMI shielded cabinet. Consideration will be given to upgrading the CCTV transmission equipment to new MBTA standards. It is also proposed that existing CCTV cameras may be relocated from the existing station to the new station. New video coaxial cable, power cable and associated conduits will be furnished and installed at the new station.

Police Talk-Back System

It is currently proposed that the existing Remote Monitor and Control Unit (RMCU) and all associated line cards may be relocated from the existing communications room to the new communications room, and installed within the EMI shielded cabinet for the CCTV system electronics. New ADA compliant police talk-back call boxes, audio cable, power cable and associated conduits will be furnished and installed at the new station. The existing stanchion(s) may be relocated from the existing station to the new station.

Telephone System

New key telephone instruments, including all cabling and conduit, will be furnished and installed at the new station to support telephone communications within the new communications room and collectors booth. Any additional station telephone requirements, including signal CIH, unit substations, power substations, mechanical equipment room, maintenance/storage room, sump pump room, MBTA Police substation, emergency control room, porter and starter booths will be furnished and installed with new telephone instruments, including all cabling and conduit. Any additional channel cards required within the relocated channel banks will be furnished and installed.

Express Communications Cables

Existing express communications cables located within the new station construction area include a 12 fiber single mode optical cable and a 100PR #19AWG T-Screen cable. These cables will be spliced into the new communications room in order to support the relocated FOTS. During demolition of the existing station, both the fiber optic cable and the T-screen cable will be spliced through and protected in place, providing cable connectivity between the new Airport Station, Maverick Station and Wood Island Stations.

Protection In Place

The Contractor will protect in place all communications cables, wayside telephones and appurtenances during all phases of construction in order to insure the continued operation of the existing communications system.

Track Construction

After demolition of the existing station a new track crossover furnished under the Blue Line Track Relocation Project will be installed in the area of the existing station.

Signal Construction

The majority of the signal work necessitated by the new location of Airport Station is expected to be completed by the Blue Line Track Relocation Contract prior to the beginning of the new station construction. Conditions for the new station signal construction will depend on the level of completion of the Blue Line Track Relocation Project. Two new Central Instrument Houses (CIH) will be in operation and will contain all control equipment required to operate automatic signal locations adjacent to the new and existing stations. Certain control equipment for signals will be furnished and installed by the Blue Line Track Relocation Project but placed in service under the Airport Station Project. New signal cable plant in the vicinity of the new station will support all leaving and entering station signals.

Signal Cable Plant

At the present time all signal cables routed through the existing station are installed under the platform overhang. Station demolition would require removal of these cables and replacement with temporary cables. Permanent cables will be installed in new raceways after demolition is completed. Retirement of existing signal instrument cases would also require installation of new express cables from the new CIHs to the first automatic signals west of the existing station on both inbound and outbound tracks.

Transfer of Signal Controls to CIH

Retirement of signal instrument cases and transfer of controls to the new CIH's will require placing in service of the signal control equipment furnished and installed under the Blue Line Track Relocation Project.

Electrically Locked Crossover

Installation of a new crossover in the vicinity of the existing station will require signal modifications to provide for point detection until hand-through switch machines with electric locks are installed and placed in service.

Bus Hold Lights

Bus Hold Lights will be provided to inform airport shuttle bus drivers about approaching trains. Bus hold lights will be operated by the train detection system (track circuits). The advance warning time desired will be specified by the Authority.

Train Status Panel

Two of these panels are presently installed at the mezzanine and inbound platform levels of the existing station. They provide train location information to the passengers waiting at the station. The usefulness of information provided by these panels to the

ridership should be reevaluated by the Authority.

Protection of Signal Equipment

The Contractor will protect in place all signal cables and appurtenances during all phases of construction in order to insure the continued operation of the existing signal system.

V. Construction Issues

Construction of the new Airport Station is an integral part of the transportation improvements in and around Logan Airport. The CA/T, Massport and the MBTA are all currently planning major construction projects in this area, at the same time. These projects are not independent from one another in that there are interdependent relationships among parts of the various projects. These interdependent parts and the schedule for their completion are not fully determined.

Sequence and Scheduling

At this time the construction of the new Airport Station is a critical milestone in the current CA/T D008A construction schedule. This schedule requires revenue service at the new station in December 2001. The existing elevated busway must be demolished to allow construction of temporary and permanent replacements for ramp connections into Logan Airport. This in turn cannot happen until the new Airport Station has been opened. Thus meeting the planned construction schedule for the new Airport Station is essential. Other aspects of the D008A construction sequence with potential impacts to the new Airport Station include the four adjacent viaducts, their supporting piers and foundations, and other temporary construction necessary to implement the roadway design.

Staging and Access

There are three major construction projects with overlapping schedules that will need access, staging and coordination through the site for the new Airport Station. In addition, the MBTA will be constructing Aquarium Station which will rely upon access through the site for delivery of equipment and materials. These materials will initially be staged at Campbell's Gate, however Campbell's Gate will be eliminated as part of the CA/T Project during the Blue Line Track Relocation, and an on/off pad for high rail vehicles will be provided at Prescott Street.

Constructability

The MBTA will be maintaining live track through the site during the course of construction. There will be potential limitations on site access and staging areas for material and assemblies as suggested by the above discussion. Therefore part of the effort in subsequent design phases will be devoted to carefully examining the constructability of the proposed designs as to the size and shape of major components as well as how and when they may be delivered and erected by the contractor.

Combined Construction

In other projects, with similar overlapping schedule and site constraints, the MBTA has on occasion elected to enter into joint construction contracts. The MBTA may find that a joint construction contract with the CA/T may be in its interests. The benefits could include avoidance of conflicts over access and staging between separate contractors, delay claims and any additional costs therefrom.

VI. Construction Cost

The total project cost will include additional costs beyond the construction cost, such as consultant final design and construction phase services, MBTA project management, and MBTA force account support attributed to additional work, including potential busing costs to transport passengers during the track and signal work for the new station. These additional costs have not been included at this level and have not been apportioned among the agencies, but will be addressed at the 30% design cost estimate.

Cost Estimate Assumptions and Methodology

An Estimated Cost of Construction was prepared for the recommended scheme. It is assumed that the construction contract for the new Airport Station will not be incorporated into the CA/T D008A construction contract, unless it is determined that this would offer potential cost savings to the Commonwealth. The methodology used to prepare the estimated cost of construction is a combination of lump sum estimates and square foot unit costs for those components which could be quantified at this time. Unit costs have been assigned relatively high cost values to define a facility with a high degree of low-maintenance, durable materials along with a level of finish in line with "airport terminal appearance and quality".

It is assumed that all communications, track and signal construction will be performed during night time non-revenue hours. Two weekend revenue service interruptions will be required to place in service new crossover and signal system modifications.

Limits of Accuracy - Range

Given that the design is at the early conceptual level, the accuracy of the information provided and estimated is limited. The estimate has taken into account inflationary costs and contingencies for design and construction, as well as special construction conditions. It is believed that this estimate can be relied upon for budgetary purposes.

Line Item Descriptions

Track – Installation of Crossover

Signal – Relocation and reconnection of signal circuits at the existing Airport Station, to accommodate the station demolition

Communications – New and reused communications equipment

Catenary/Power – Reconnection of trolley wire to new platform canopy, provision of primary power to station

Demolition, Existing Station – Removal of existing station to 1' below final grade

Bus canopy w/paving, lighting, etc. – Canopy, sidewalk, curb, lighting, misc. furnishings

Platform/Train canopies:

- platform: from pile caps to finished paving

- canopy: support structure, roof, lighting, signage etc.

- side walls, 10' high: south wall facing busway

Pile, 150' long – precast concrete piles

Sheet piling – steel sheet piling adjacent to track

Support space w/roof (gross floor area): floors, walls, roof

Concourse, no roof or hvac: from pile caps to roof less major equipment itemized below

Roof to Concourse: roof and structure for concourse

Escalator, heavy duty

Elevator, 10' x 12', glass encl., 4# openings, front & rear

Elevator, 10' x 12', glass encl., 2# openings, front & rear

Elevator, 8' x 8', glass encl., 2# openings, front & rear

Fare collection:-

- collector's booths

- turnstiles

- ticket vending machines

Generator/Unit substation/UPS

Site Work/Site Utilities:-

- soil removal

- extra cost for hazardous material

- fill: to raise grade +/- 4'

- plazas, paving, etc.: paving improvement beyond sidewalk at busway

- railings, walls, site improvements, etc.: plaza area structures associated with raising grade

- landscaping: allowance

- site utilities: allowance

- site lighting: allowance

Comparison of Alternatives

The other schemes developed during the Concept Design Phase have not been specifically estimated at this time. Given that the programmatic contents are identical, the site issues are identical, and portions of the design are nearly identical, it can be assumed that there are no significant differences in the relative costs of the three schemes.

The differences which can be identified at this time are qualitatively definable but cannot be quantitatively evaluated with any degree of certainty. The differences between the schemes are related to their relative geometric complexity or simplicity and the cost implications of the component assemblies.

The rectilinear Scheme C could be expected to be the lowest cost as the assembly components are generally all rectangular, simplifying fabrication and fit. Both Scheme A and Scheme B could have some premium for the angular geometries of the train platform canopy, bus platform canopy and concourse. Scheme B, the recommended scheme, could have an additional cost premium for the curved geometry of the concourse and crossovers. The MBTA has requested that these differences be quantified, however, reliable estimates cannot be provided with confidence, due to the conceptual level of architectural and engineering development. From a qualitative level it seems reasonable to assume that Scheme B will be the more expensive of the three, Scheme A will offer some cost saving of a modest degree and Scheme C will prove the most economical.

Given the public importance of Airport Station for the MBTA and Massport as the gateway between their respective systems, as well as the gateway to the metropolitan Boston region, and the relatively minor cost differences among alternative schemes, it is recommended that cost should not be the primary basis of choice for such an important high volume, high visibility station.

Apportioned Cost of Construction

The decision to relocate Airport Station has substantial impacts to the cost of design and construction. Prior to the decision to relocate the station, the MBTA had planned and budgeted for a major modernization of the existing station. The construction of a completely new station results in cost premiums over the original station modernization budget. It is anticipated that the Massachusetts Highway Department and/or Massport will share in the cost premiums for the relocated station. At the request of the MBTA, an analysis of the above cost estimate was undertaken to apportion the estimated costs into two categories: those costs ascribable to the MBTA (costs which would have been incurred as part of the planned modernization of the existing Airport Station) and those costs, ascribable to other agencies (the result of building at a new site or costs previously planned to be shared between agencies). The following breakdown of the cost estimate identifies the particular costs believed to be associated with each of these two categories.

The rationale for apportionment of the above costs is to identify additional costs resulting from the relocation of the station. An item by item discussion of the reasoning follows.

- The estimate has identified costs for railroad work including track, signal, power, communications. While the Blue Line Track Relocation Project will be working in this area, the estimate covers those items which cannot be completed prior to the construction of the new station. It is understood that none of this work would be required under an existing station modernization program.
- Demolition of the existing Airport Station is an added cost due to the relocation of the station.
- The new bus canopy, paving, lighting, etc. is an item being provided for the benefit of Massport's Logan ridership and as such is considered to be a shared expense.
- The construction of new train platforms is an added cost due to the relocation of the station.
- Pile costs and foundations for building and platform support would generally not be required under an existing station modernization program and therefore the cost apportioned is 10% to the MBTA.

- Sheet piling is necessary to stabilize the track during excavation for the station platform foundations.
- Within the concourse the costs of the paid crossover, the heavy duty escalators, the unpaid crossover elevator and the premium for oversized elevators at the paid crossover are all costs attributable to moving the station to a site which precludes the crossplatform transfer.
- Fare collection costs have increased due to the secondary entrance requested by the East Boston community and the CA/T Project and therefore the cost apportioned is 75% to the MBTA.
- The majority of the costs associated with site work are ascribed to the relocation of the station. There were no retaining walls to hold fill at the existing site. The new station is expected to require substantial utility relocations, extensive paving and plaza area, new MBTA access roads and cover a much larger footprint than under the modernization of the existing station. Therefore the costs apportioned are 25% to the MBTA.

In summary, the overall construction cost of the station is estimated at $26.746 million of which $12.784 million in cost can be identified as potentially reimbursable by others, leaving a balance of $13.962 million to be funded by the MBTA. This, on an order of magnitude, is in line with prior budgeting assumptions by the MBTA for the modernization of the existing Airport Station.

Estimate

Description	Qty	Unit	Rate	Amount
Track	1	ls	100,000.00	100,000
Signal	1	ls	600,000.00	600,000
Communications	1	ls	400,000.00	400,000
Catenary/Power	1	ls	500,000.00	500,000
Demolition	1	ls	500,000.00	500,000
Bus canopy w/paving, lighting,	12,000	sf	100.00	1,200,000
Platform/Train canopies:-				
- platform	9,000	sf	50.00	450,000
- canopy	10,600	sf	150.00	1,590,000
- side walls, 10' high	300	lf	500.00	150,000
Pile, 150' long	250	ea	5,250.00	1,312,500
Sheet piling	6,000	sf	30.00	180,000
Support space w/roof	2,625	sf	150.00	393,750
Concourse, no roof or hvac	17,800	sf	175.00	3,115,000
Roof to Concourse	19,350	sf	130.00	2,515,500
Escalator, heavy duty	4	ea	500,000.00	2,000,000
Elevator, 10' x 12', glass encl., 4# openings, front & rear	1	ea	220,000.00	220,000
Elevator, 10' x 12', glass encl., 2# openings, front & rear	1	ea	210,000.00	210,000
Elevator, 8' x 8', glass encl., 2# openings, front & rear	1	ea	190,000.00	190,000
Fare collection:-				
- collector's booth	2	ea	100,000.00	200,000
- turnstile	12	ea	5,000.00	60,000
- ticket vending machine	12	ea	10,000.00	120,000
Generator/Unit Substation/UPS	1	ea	350,000.00	350,000
Site Work/Site Utilities:-				
- soil removal	5,400	ton	33.00	180,000
- extra cost for hazardous material	540	ton	140.00	75,600
- fill	6,700	cy	25.00	167,500
- plazas, paving, etc	30,000	sf	10.00	300,000
- railings, walls, site improvements, etc	1	ls	100,000.00	100,000
- landscaping	1	ls	150,000.00	150,000
- site utilities	1	ls	500,000.00	500,000
- site lighting	1	ls	75,000.00	75,000
Sub-Total Construction				**17,904,850**
General Requirements	@10%			1,790,485
Special Conditions	@5%			895,243
Escalation to mid point of construction 1Q01	@14.38%			2,574,717
Design Contingency	@10%			1,790,485
Construction Contingency	@10%			1,790,485
Total Construction Cost				**26,746,265**

APPORTIONED ESTIMATE

Description	Estimated Amounts	Apportioned Amounts MBTA	Apportioned Amounts MHD/MPA
Track	$ 100,000.00		$ 100,000.00
Signal	$ 600,000.00		$ 600,000.00
Communications	$ 400,000.00	$ 200,000.00	$ 200,000.00
Catenary/Power	$ 500,000.00		$ 500,000.00
Demolition, Existing Station	$ 500,000.00		$ 500,000.00
Bus canopy w/paving, lighting, etc.	$ 1,200,000.00	$ 600,000.00	$ 600,000.00
Platform/Train canopies:-			
- platform	$ 450,000.00		$ 450,000.00
- train canopy	$ 1,590,000.00	$ 1,590,000.00	
- side walls, 10' high	$ 150,000.00	$ 150,000.00	
Pile, 150' long	$ 1,312,500.00	$ 131,250.00	$ 1,181,250.00
Sheet piling	$ 180,000.00		$ 180,000.00
Support space w/roof	$ 393,750.00	$ 393,750.00	
Concourse, no roof or hvac	$ 3,115,000.00	$ 2,450,000.00	$ 665,000.00
Roof to Concourse	$ 2,515,500.00	$ 2,515,500.00	
Escalator, heavy duty	$ 2,000,000.00		$ 2,000,000.00
Elevator, 10' x 12', glass encl., 4# openings, front & rear	$ 220,000.00	$ 190,000.00	$ 30,000.00
Elevator, 10' x 12', glass encl., 2# openings, front & rear	$ 210,000.00	$ 190,000.00	$ 20,000.00
Elevator, 8' x 8', glass encl., 2# openings, front & rear	$ 190,000.00		$ 190,000.00
Fare collection:-			
- collector's booth	$ 200,000.00	$ 150,000.00	$ 50,000.00
- turnstile	$ 60,000.00	$ 45,000.00	$ 15,000.00
- ticket vending machine	$ 120,000.00	$ 90,000.00	$ 30,000.00
Generator/Unit Substation/UPS	$ 350,000.00	$ 350,000.00	
Site Work/Site Utilities:-			
- soil removal	$ 180,000.00	$ 45,000.00	$ 135,000.00
- extra cost for hazardous material	$ 75,600.00		$ 75,600.00
- fill	$ 167,500.00		$ 167,500.00
- plazas, paving, etc	$ 300,000.00	$ 75,000.00	$ 225,000.00
- railings, walls, site improvements, etc	$ 100,000.00		$ 100,000.00
- landscaping	$ 150,000.00	$ 37,500.00	$ 112,500.00
- site utilities	$ 500,000.00	$ 125,000.00	$ 375,000.00
- site lighting	$ 75,000.00	$ 18,750.00	$ 56,250.00
Sub-Total Construction	$ 17,904,850.00	$ 9,346,750.00	$ 8,558,100.00
General Requirements (10%)	$ 1,790,485.00	$ 934,675.00	$ 855,810.00
Special Conditions (5%)	$ 895,242.50	$ 467,337.50	$ 427,905.00
Escalation to mid point of construction 1Q01 (14.38%)	$ 2,574,717.43	$ 1,344,062.65	$ 1,230,654.78
Design Contingency (10%)	$ 1,790,485.00	$ 934,675.00	$ 855,810.00
Construction Contingency (10%)	$ 1,790,485.00	$ 934,675.00	$ 855,810.00
Total Construction Cost	$ 26,746,264.93		
Total MBTA Apportioned Cost		$ 13,962,175.15	
Total MHD/MPA Apportioned Cost			$ 12,784,089.78

VII. Outstanding Issues

- East Boston community acceptance
- Regulatory Reviews
- Design and construction schedule milestones (see *Appendix H*)
- Construction sequence and phasing
- Design and construction coordination with Massport and CA/T Project
- Coordination of existing and proposed utilities with CA/T Project and Massport
- Project limit of work in relation to CA/T Project
- Location and size of highway viaduct piers
- Access to the existing MBTA substation
- Geotechnical impacts of raising grades to platform elevation

Appendix A. Airport Station Ridership Analysis

The 1994 CTPS rider counts were used to determine the distribution and percentages of riders boarding / alighting - inbound / outbound. Branch diagrams were created (as follows) for the projected ridership figures, to illustrate the breakdown of riders in a given day down to the peak hour and the peak 15 minute time periods.

From the 1994 CTPS counts, the peak hour for total Airport Station boardings and alightings is from 4pm-5pm and from 5pm-6pm. The peak hour figures, shown below, have been further broken down into peak 15 minute periods for use in the evaluation of station components, access and egress, square footages of proposed schemes, and to compare the headways of both the buses and the MBTA.

Branch Diagram 1

Airport Station Projected Weekday 2010 Ridership Community Riders Only 2600	Blue Line Boardings (50%) **1300**	Inbound (93%) 1209	Peak Hour* 73	Peak 15 min 27
		Outbound (7%) 91	Peak Hour* 5	Peak 15 min 2
	Blue Line Alightings (50%) **1300**	Inbound (7%) 91	Peak Hour 21	Peak 15 min 8
		Outbound (93%) 1209	Peak Hour 278	Peak 15 min 104

** Using PM peak hour to be consistent with peak hour for airport related riders*

In addition to illustrating the breakdown of Logan Airport related riders using the Blue Line (From Table 3 on the following pages), Branch Diagram 2 associates the number of passengers in a peak 15 minute period with the required number of buses to service the passengers. (This study assumes a bus capacity of 35 passengers.)

Branch Diagram 2

Airport Station Projected Weekday 2010 Ridership Total Airport Related Riders (from Table 3) **9200**	Blue Line Boardings (50%) **4600**	Inbound (93%) 4278	Peak Hour 642	Peak 15 min 241	Required No. of bus trips (35 Pass/Bus) **7-8 buses / 15 min peak** (from the terminals)
		Outbound (7%) 322	Peak Hour 48	Peak 15 min 18	
	Blue Line Alightings (50%) **4600**	Inbound (7%) 322	Peak Hour 48	Peak 15 min 18	Required No. of buses (35 Pass/Bus) **7-8 buses / 15 min peak** (to the terminals)
		Outbound (93%) 4278	Peak Hour 642	Peak 15 min 241	

The combined breakdown of projected Airport Station community riders and Logan Airport related riders from Table 4 on the following pages is as follows:

Branch Diagram 3

Airport Station Projected Weekday 2010 Ridership Combined Airport Related and Community Riders 11800	Total Blue Line Boardings **5900**	Inbound 5487	Peak Hour 714	Peak 15 min 268
		Outbound 413	Peak Hour 54	Peak 15 min 20
	Total Blue Line Alightings **5900**	Inbound 413	Peak Hour 69	Peak 15 min 26
		Outbound 5487	Peak Hour 920	Peak 15 min 345

Projection of Ridership at Airport Station in Year 2010

From CTPS Model - Average Weekday Logan Air Passengers to Logan. Table 1 below represents riders in only one direction, not including employees, rental car pick-ups, meeters/greeters, and other Logan related.

Note: CTPS model assumed Airport Station in its existing location.

Table 1

	Year 2010 Airport Station Pass	%
Red Line	2,347	54.1%
Blue Line	1,992	45.9%
Total MBTA	**4,339**	

Using the 1989 CTPS ridership counts of Airport Station prepared for the MBTA, percentages of total Blue Line passengers going to Logan Airport and from Logan Airport are determined as 50% and 50%, respectively. Applying those percentages to the numbers above it can be estimated:

Table 2

	Year 2010 Airport Station Pass	%
Air Passengers using the Red Line to Logan (from Table 1)	2,347	50%
Air Passengers using the Red Line from Logan	2,347	50%
Total Logan Air Passengers using Red Line	**4,694**	
Air Passengers using the Blue Line to Logan (from Table 1)	1,992	50%
Air Passengers using the Blue Line from Logan	1,992	50%
Total Logan Air Passengers using Blue Line	**3,984**	

Projection of Ridership at Airport Station in Year 2010 (continued)

From CTPS Regional Travel Forecasting Model - Covers all travel within the region, Table 3 represents TOTAL LOGAN RELATED RIDERS (incl. passengers, employees, rental car related, meeters/greeters and other).

Table 3 Total Airport Station Logan Related Riders (including air passengers/other) **in ONE direction**

Year 2010 Airport Station Boardings	**2010 Build 2 *** Airport Station Boardings
5,900	1,300

5,900 - Total Blue Line Boardings	**1,300** Total Blue Line Community Riders Only	**= 4600** **Total Logan Related Riders in ONE direction**

TOTAL LOGAN RELATED RIDERS IN BOTH INBOUND AND OUTBOUND DIRECTIONS AT AIRPORT STATION = **9,200**
(The 1990 and 1994 Ridership counts show a 50%/50% split of boardings and alightings for Airport Passengers - See Also Table 2)

Table 4 combines the Total projected Logan Airport Related Riders and the Total Community Riders as indicated in the CTPS Regional Travel Forecasting Model to determine the total Blue Line Riders at each station.

Table 4 TOTAL BLUE LINE RIDERS (combined Logan Air related and Community Riders)

	Year 2010 Airport Station
Logan Airport related from Table 3	**9,200**
Community Riders from CTPS ridership projections Regional Travel Forecasting Model	**2,600**
Total Blue Line Riders	**11,800**

** 2010 Build 2 was a model assuming that airport shuttle bus operations would be moved to Wood Island Station, leaving the existing Airport Station as a community station only. Moving the shuttle bus operations to Wood Island is no longer under consideration.*

1 0 1997

BOARDINGS ONLY

CTPS Regional Travel Forecasting Model FOR YEAR 2010

Covers all travel within the region

RECD FROM CTPS
NOTES ADDED BY
WFA FOR CLARITY

	BASE (Airport Station)	Build 1 (Only Wood Island Sta) *	BOARDINGS Build 2 (Both Stations) *
Blue Line Travel Times			
Inbound from Wonderland	10:41 to Airport Station	9:35 to Wood Island Station	9:35 to Wood Island Station
Outbound from Bowdoin	11:38 to Airport Station	11:54 to Wood Island Station	12:24 to Wood Island Station
Inbound to Bowdoin	9:15 from Airport Station	10:27 from Wood Island Station	11:10 from Wood Island Station
Outbound to Wonderland	12:59 from Airport Station	10:46 from Wood Island Station	10:56 from Wood Island Station
(MBTA memo 5/14/97)			
MBTA Bus Routes	No changes to existing routes	No changes to existing routes	No changes to existing routes
Dwell Times Airport Station			
Outbound to Wonderland	45 seconds	None	15 seconds
Inbound to Bowdoin	35 seconds	None	20 seconds
Dwell Times Wood Island Station			
Outbound to Wonderland	40 seconds	40 seconds	50 seconds
Inbound to Bowdoin	30 seconds	30 seconds	40 seconds
Model Constraints	Commuter Rail Parking Capacities	Commuter Rail Parking Capacities	Commuter Rail Parking Capacities
Walking Access Assumptions	3 mph, 0.5 miles max distance	3 mph, 0.5 miles max distance	3 mph, 0.5 miles max distance
Passenger Transfer Time in the Statio	1 minute	1 minute	1 minute
Blue Line Boardings	65,500	65,000	65,500
Maverick Station	9,200	10,100	9,200
Airport Station	5,900	0	1,300
Wood Island Station	2,300	7,100	6,900
Orient Heights Station	4,400	4,400	4,400
Other Stations	43,700	43,400	43,700

← COMBINED AIRPORT-RELATED + COMMUNITY RIDERS BOARDING AT AIRPORT STATION

← COMMUNITY RIDERS BOARDING AT AIRPORT STATION

* BUILD 1 WAS A MODEL ASSUMING THAT AIRPORT SHUTTLE BUS OPERATIONS WOULD BE MOVED TO WOOD ISLAND STATION AND THAT THE EXISTING AIRPORT STATION WOULD BE CLOSED.

BUILD 2 WAS A MODEL ASSUMING THAT AIRPORT SHUTTLE BUS OPERATIONS WOULD BE MOVED TO WOOD ISLAND STATION, LEAVING THE EXISTING AIRPORT STATION AS A COMMUNITY STATION ONLY.

NEITHER BUILD 1 NOR BUILD 2 IS UNDER CONSIDERATION AS OF MAY 1998.

Appendix B. Airport Station Throughput Criteria

Typical Station Design Criteria

For the design of the new Airport Station, MBTA required standards and established transit design criteria are used to evaluate the systems and components of each proposed scheme. The criteria are as follows:

Entrances		
Free Swinging Doors (Passengers with luggage)	20-25 persons / minute	
Free Swinging Doors (Passengers with no luggage)	40-60 persons / minute	
Revolving - One Direction (Passengers with no luggage)	25-35 persons / minute	
Stairs		
4'-0" wide stair (2 walking lanes wide of 2'-0" each) = 2 lanes in one direction or 1 lane in two directions	15 persons / minute / lane	
For passengers with luggage on 4'-0" wide stair (1 lane wide) = 1 lane in one direction only	10-15 persons / minute	
Walkways		
Bridge or overhead connecting element / walkway (i.e. a 16'-0" wide bridge - 2'-0" buffers on each side = 12'-0" of walkway = 120 - 180 person / minute)	10-15 persons / minute / foot width	
Level passageways	20-25 persons / minute / foot width	
Escalators		
Standard 4'-0" wide tread width	100 persons / minute	
Standard queue lengths		
20' long queue	12 persons (approx)	
40' long queue	24 persons (approx)	
50' long queue	30 persons (approx)	
60' long queue	36 persons (approx)	
70' long queue	42 persons (approx)	
MBTA min. queue length at fare collection (min. queue space on both sides of turnstile bank)	20' long or 12 persons (approx)	
MBTA total depth of fare collection area (excluding circulation run-off and through circulation paths)	44' min. overall depth	
Standard queue width	varies depending on condition	
Standard Waiting / Queuing Areas		
Concourse / General Entrance - (For persons with luggage --excluding fare collection minimum requirements)	15 SF / person	"Comfort Queue"
	10 SF / person	"Ordered Queue"
	5 SF / person	"Jam Queue"
Escalator clear floor area Top and bottom of escalator for boarding and discharging	10 SF / person (in a surge)	
Fare collection		
Ticket / token collection at booth	6-8 persons / min.	Or 1 person every 10 seconds
Turnstiles - Paid direction	15-20 persons / min.	Or 1 person every 3-4 seconds
Turnstiles - Unpaid direction	30-40 persons / min.	Or 1 person every 2 seconds

Compiled from MBTA Design Guidelines and 'Pedestrian Planning and Design', by John Fruin

Appendix C. Airport Station Component Analysis

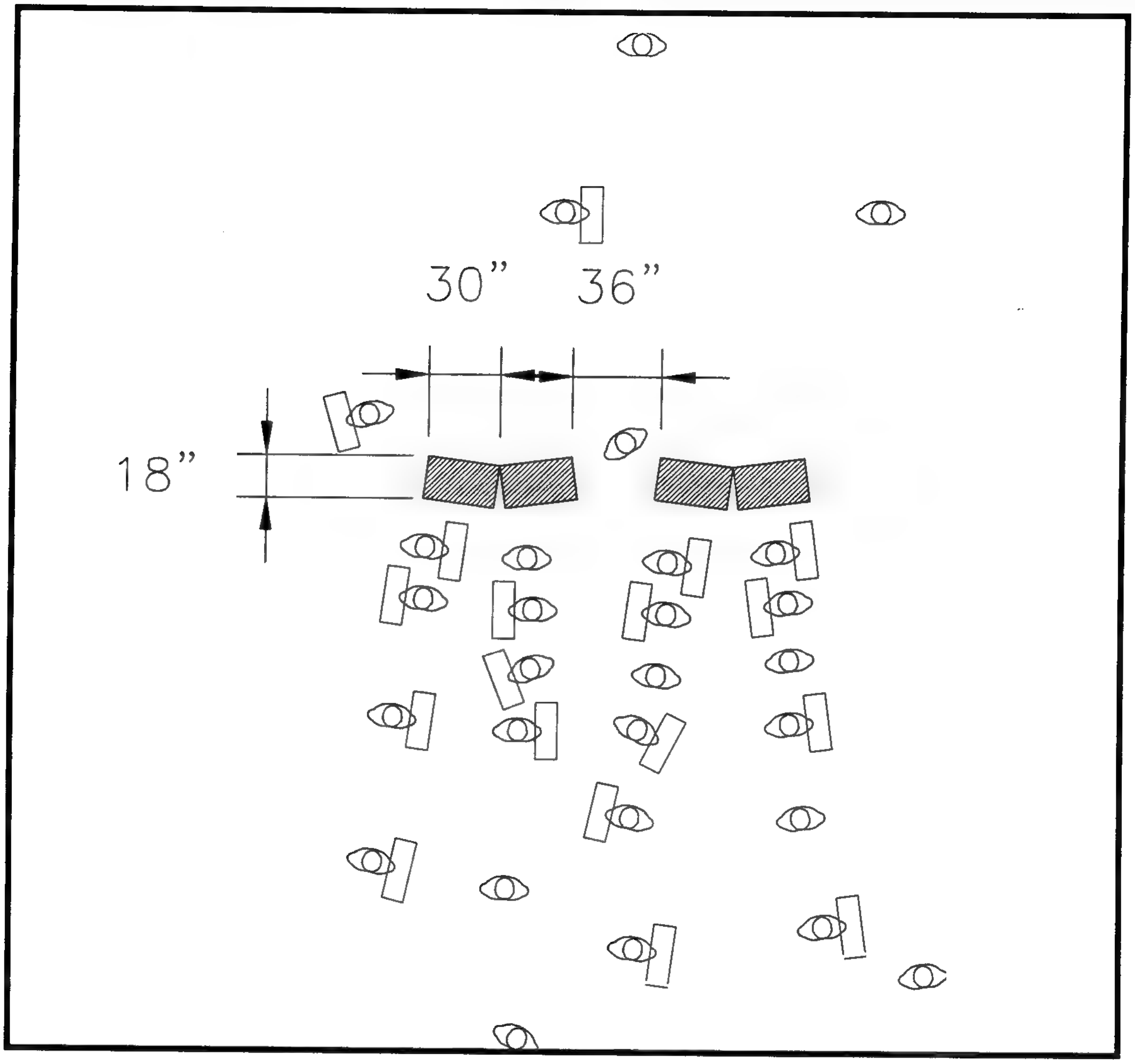
Introduction

This booklet documents WFA observations on a number of critical design components for the new MBTA station at Logan Airport. Each diagram is meant as a tool for design and programming, illustrating relevant dimensional and organizational information for each component. The diagrams do not show specific layouts or sequential arrangements. The specific quantities shown in these diagrams are based on a preliminary understanding of the program and are subject to change when a more complete review is performed.

The following diagrams are included in this booklet:

- Vertical Circulation
- Automatic Token Vending Machines
- Automatic Ticket Vending Machines (future)
- Present Fare Collection Standards
- Future Collection Standards
- Platform Area
- Passenger Information Systems (Flight Monitor) Information

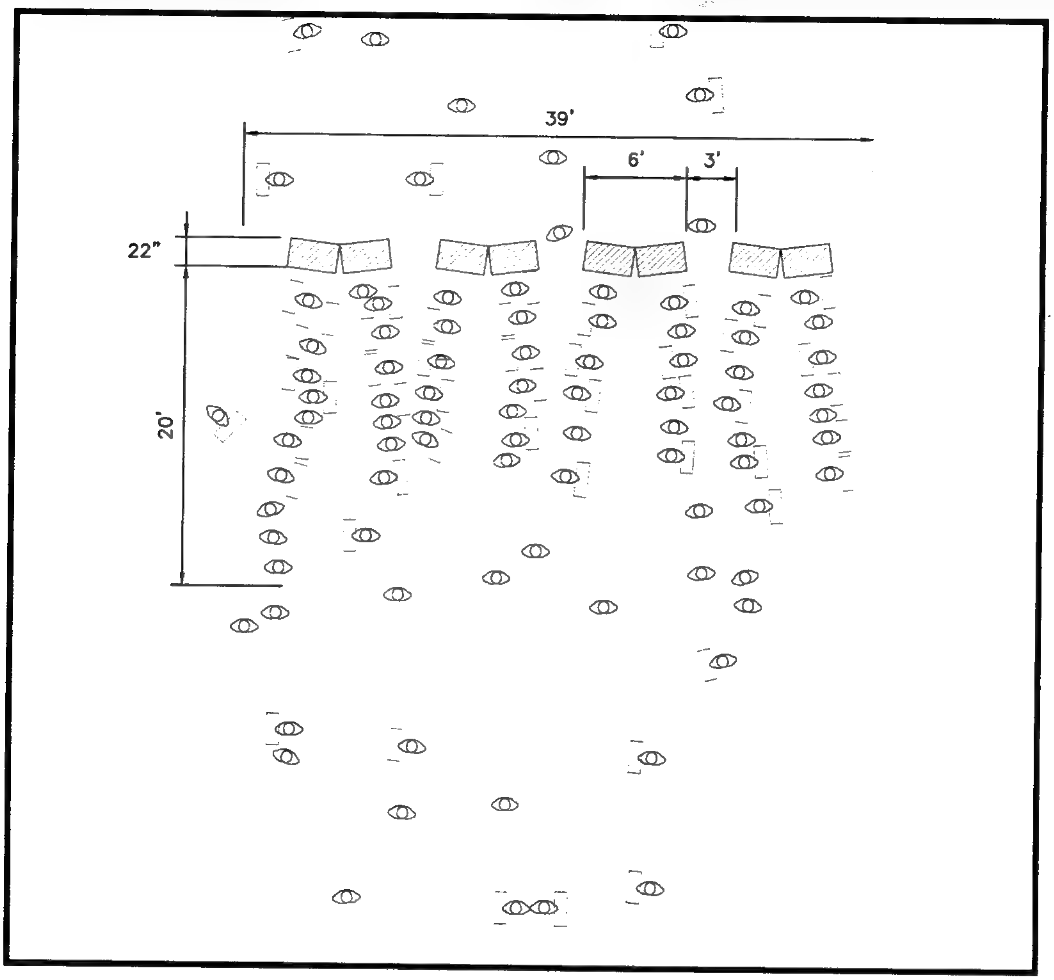
Current standards-Automatic Token Vending Machines



Analysis

In the present MBTA fare collection system, automatic token vending machines are used to supplement the fare collection booths. According to the 1994 CTPS MBTA Systemwide Survey, at the current Blue Line-Airport Station, 65% of all passengers must purchase tokens and 35% will have passes. Currently 2 automatic token vending machines are installed at the Station. Assuming growth in passenger boardings with time, WFA assumes that the new Airport Station have 4 automatic token vending machines. As shown in this diagram, the 4 machines will require 200 SF of space.

Future standards - Automatic Ticket Vending Machines

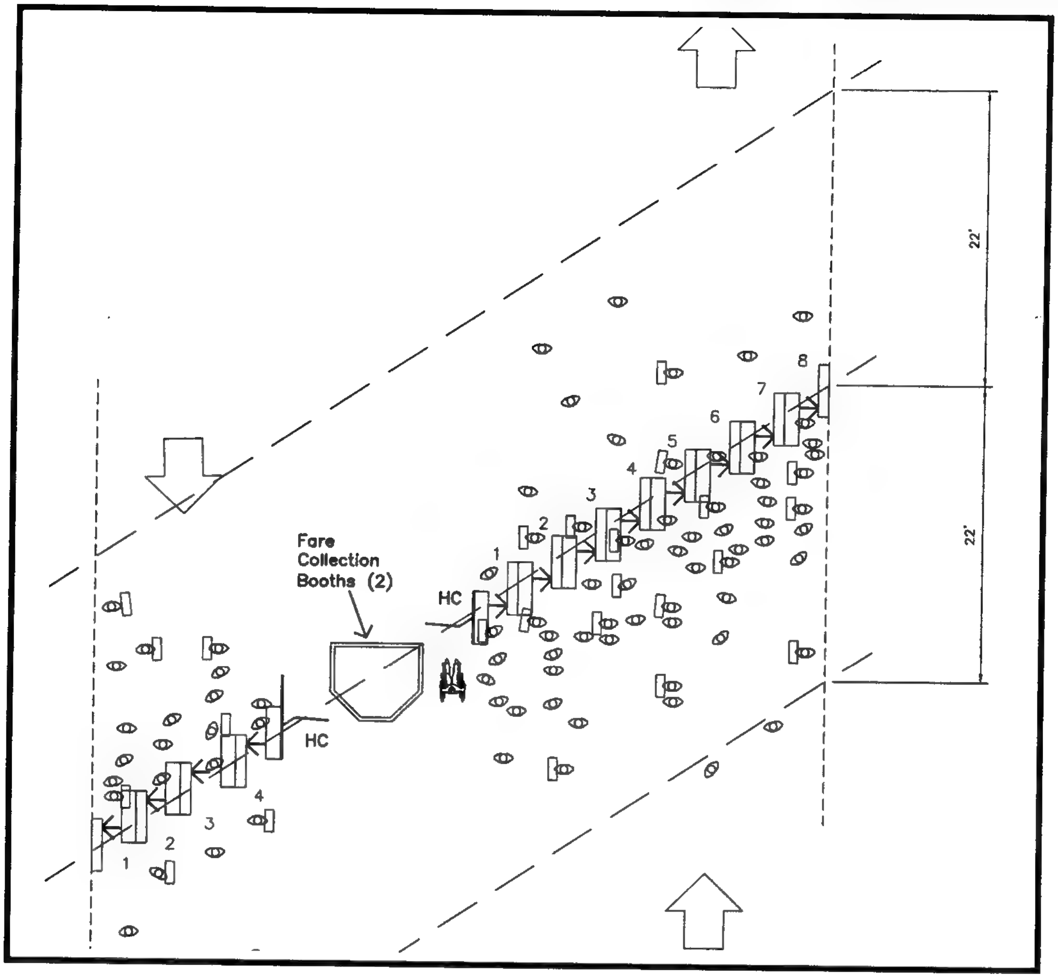


Analysis

WFA determined the size of the ATVMs using a MBTA memorandum from Daniel Breen, Systems Engineering Officer, regarding Fare Collection Information (December 15, 1995) as a reference. In the future the MBTA will be switching its fare collection system from the current token-based system, to one that uses magnetically coded tickets. Since the future fare collection system will not have employee-staffed fare collection booths, there will be greater demand for automatic vending units than under the current standards.

From the WFA "Peak Passenger Flow Diagram", which assumes a maximum peak period throughput of 12 people per machine, eight automated ticket vending machines appears adequate, though the MBTA should provide direction on this issue. MBTA design standards dictate that a twenty foot queue length be allotted for a twelve person queue. This diagram assumes 36" of passenger space plus machines of 36", generating an arrangement of lines 6' on center.

Current Standards - Fare Collection



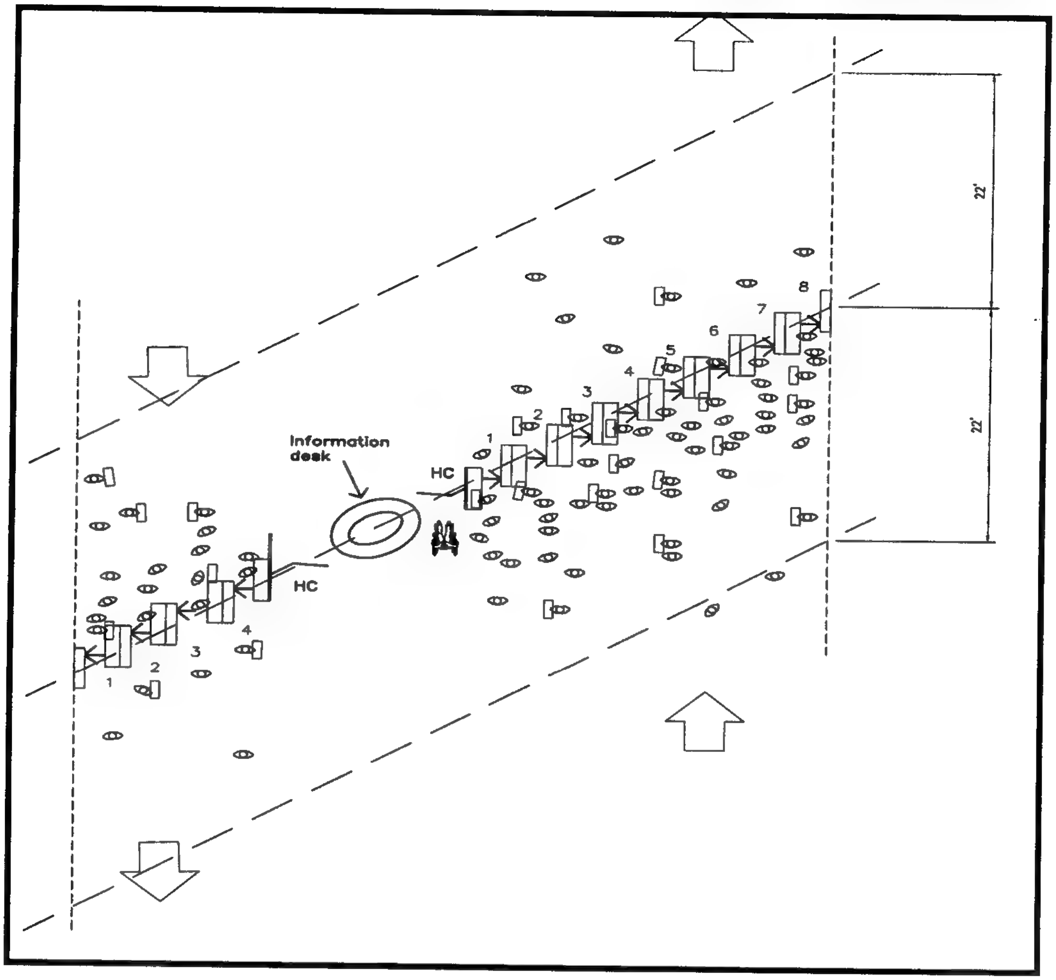
Analysis

WFA determined the size required for fare collection using the MBTA Memorandum from Daniel Breen, Systems Engineering Officer, regarding Fare Collection Information, December 15, 1995. This document calls for standard turnstiles on 31" centers and a total width for handicap gates as 44 3/4." The width of the handicap gate provides for a swing gate with a minimum clearance of 36."

Mr. Rick Leary, in charge of fare collection procurement at the MBTA, provided WFA with an estimate of the number of turnstiles to be required at Airport Station. Based on the CTPS ridership projection for the year 2010 of 11,800 daily riders the MBTA estimates a requirement of 8 turnstiles dedicated to entry and 4 turnstiles dedicated to exit.

The diagram on this page shows the minimum required space for 12 turnstiles, 2 collection booths with 2 HC gates, and a total fare collection depth of 44' (from MBTA Design Guidelines, 1977).

Future Standards - Fare Collection

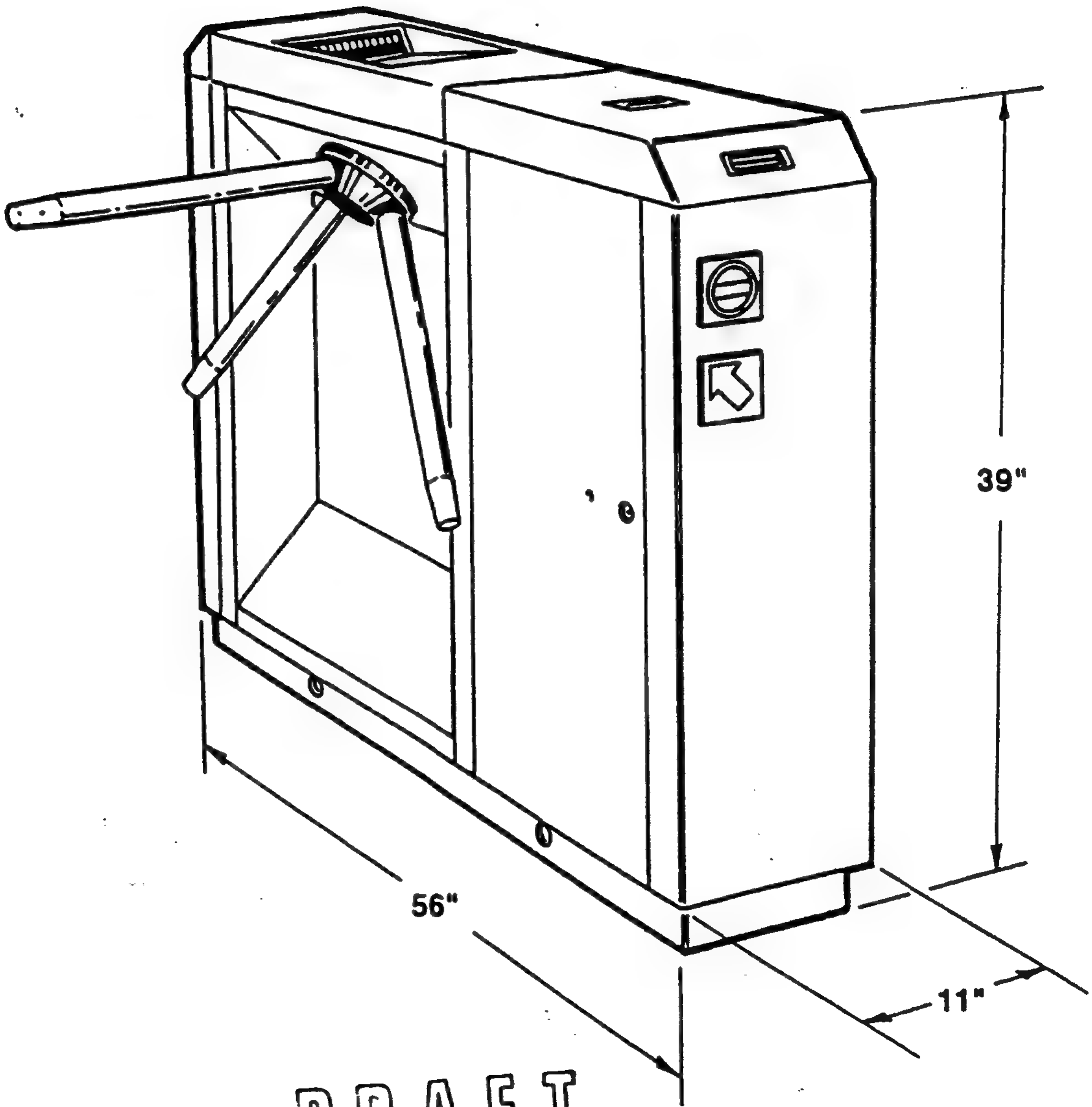


Analysis

The future MBTA fare collection system will not have staffed fare collection booths. Instead there will be an information desk stationed by a mobile employee, who can attend to whatever issues arise at the station. According to draft information received by WFA from the MBTA, the new system will use turnstiles with the same 31" centers as the current token based turnstiles. Therefore, by placing the information desk in the same location as the fare collection booths, the same fare collection area will be able to accommodate both the current and future fare collection systems.

MBTA PROPOSED FUTURE FARE COLLECTION

TURNSTILE



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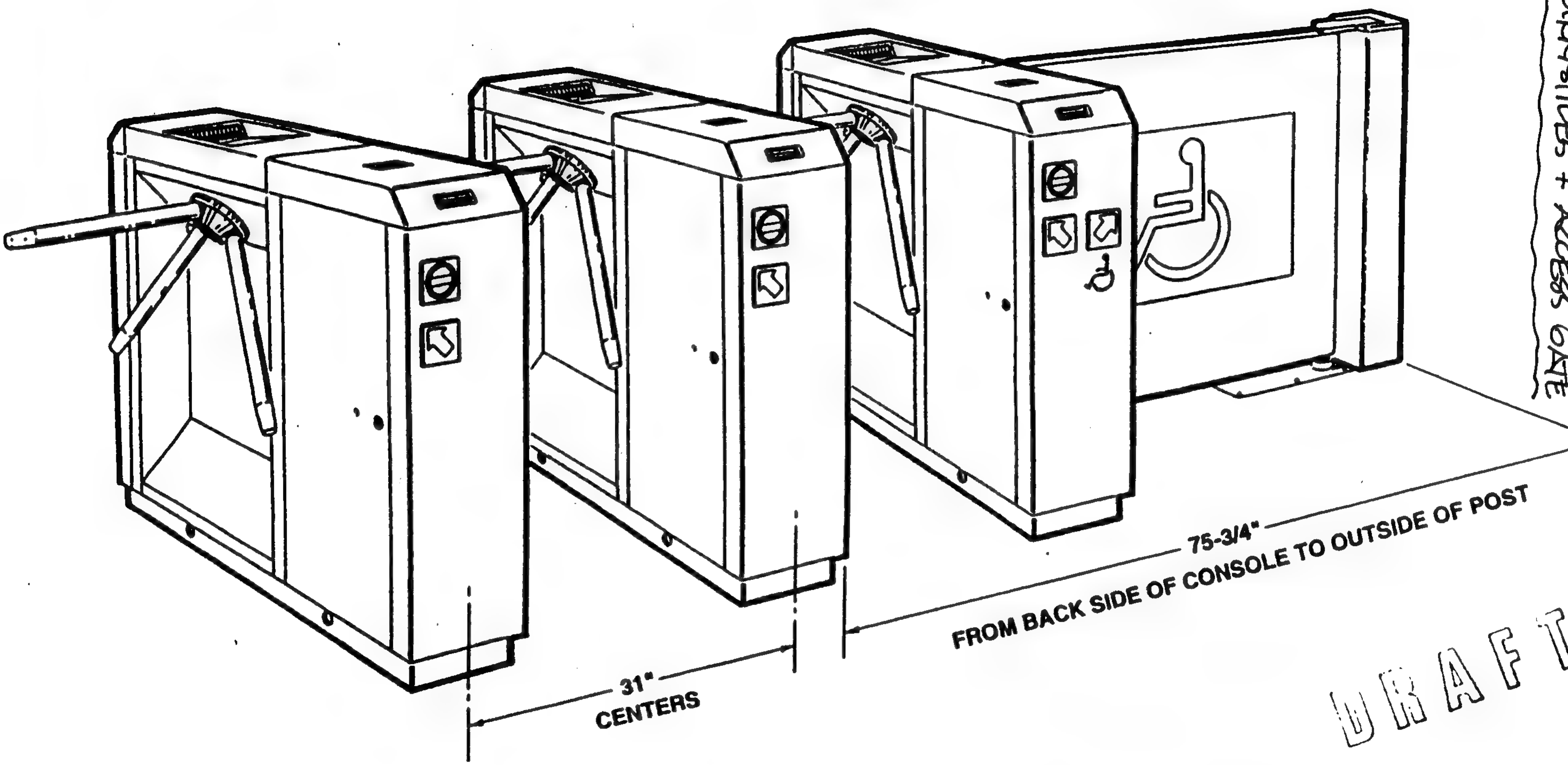
MBTA PROPOSED FUTURE FARE COLLECTION
TURNSTILES + ACCESS GATE



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ENTRY GATES: CONSOLE 11" WIDE + 20" AISLE = 31" CENTERS

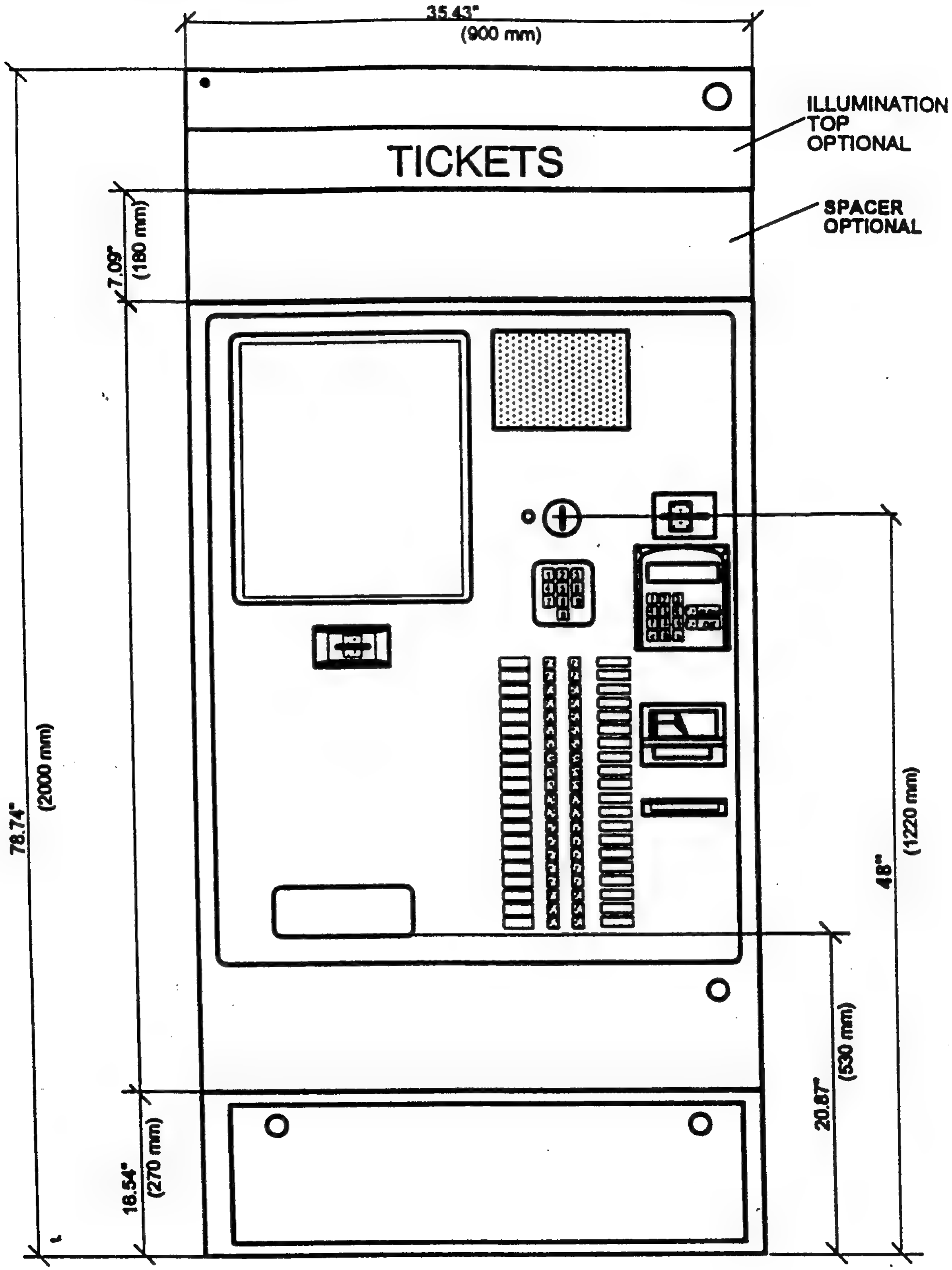
H-CAP SWING GATE & ENTRY GATE } 44-3/4" WIDE + 11" CONSOLE + 20" AISLE = 75-3/4"

MBTA PROPOSED FUTURE FARE COLLECTION
ACCESSIBLE GATE

DRAFT

MBTA PROPOSED FUTURE FARE COLLECTION
ACCESSIBLE TICKET VENDING MACHINE (ATVM)

MBTA- BOSTON: ATVM FRONT VIEW WITH DIMENSIONS



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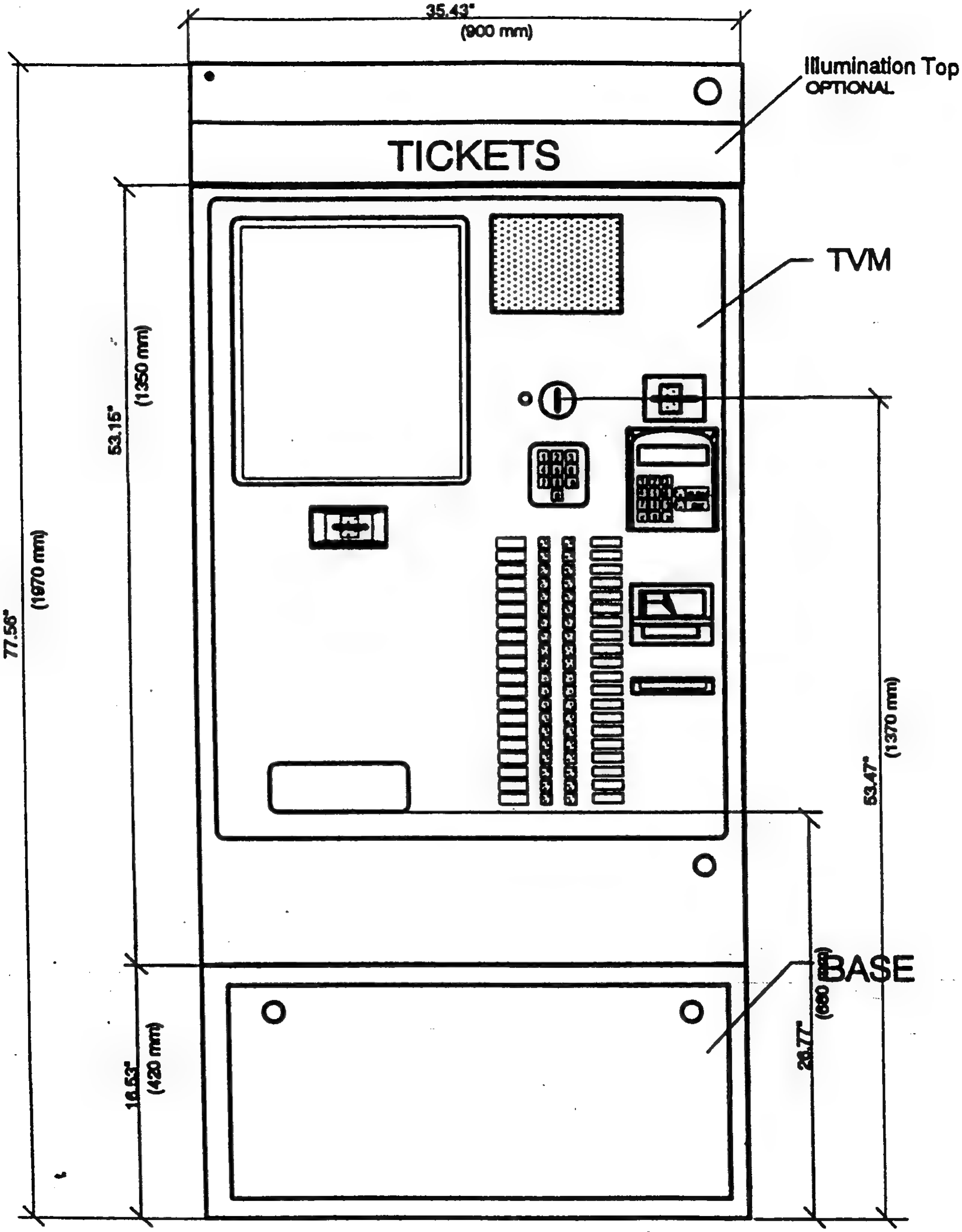
MBTA PROPOSED FUTURE FARE COLLECTION
TICKET VENDING MACHINE (TVM)

MBTA-BOSTON: TVM FRONT VIEWWITH DIMENSIONS



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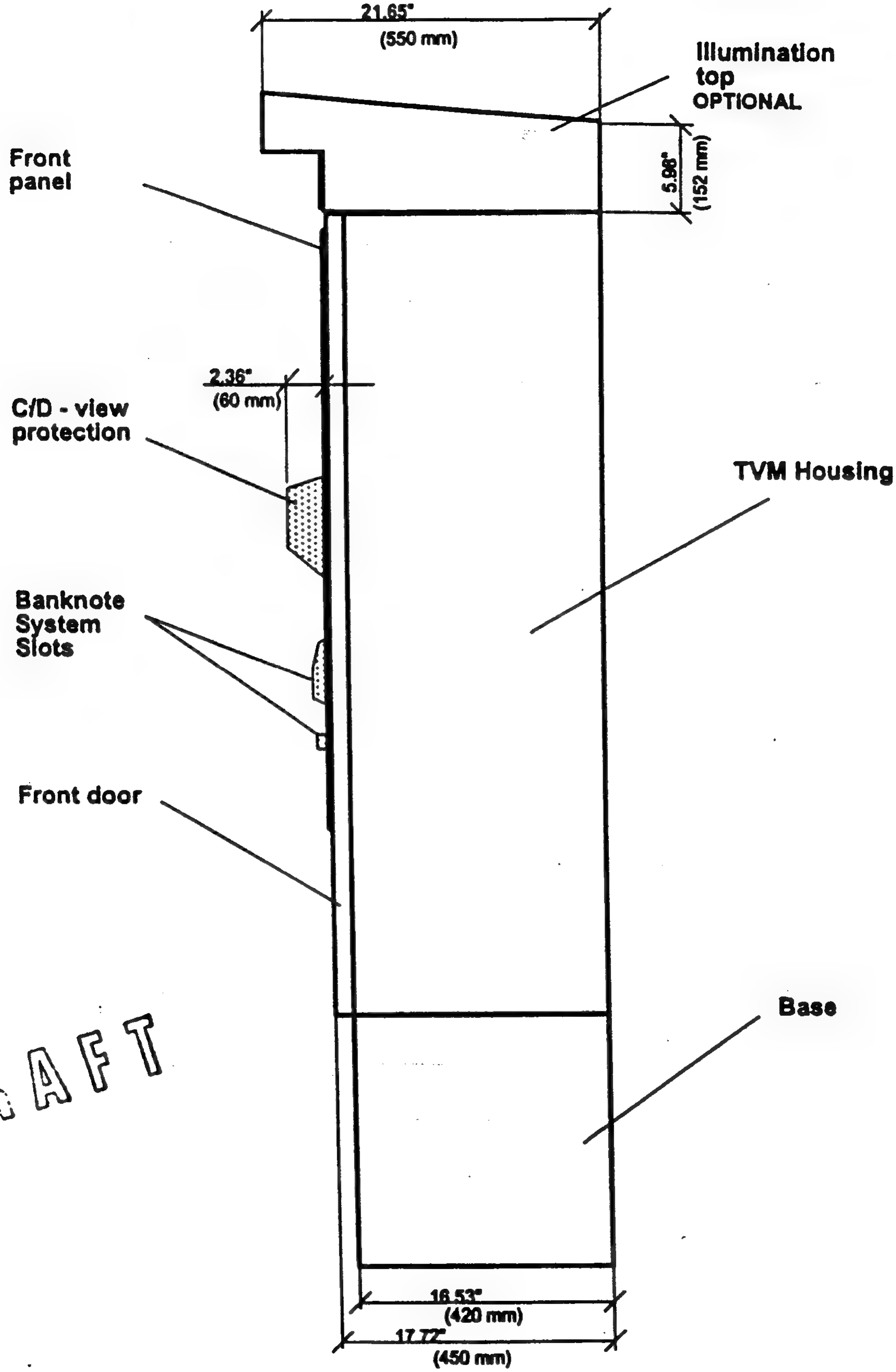
MBTA PROPOSED FUTURE FARE COLLECTION
TICKET VENDING MACHINE (TVM)

MBTA-BOSTON: TVM Side View with Dimensions



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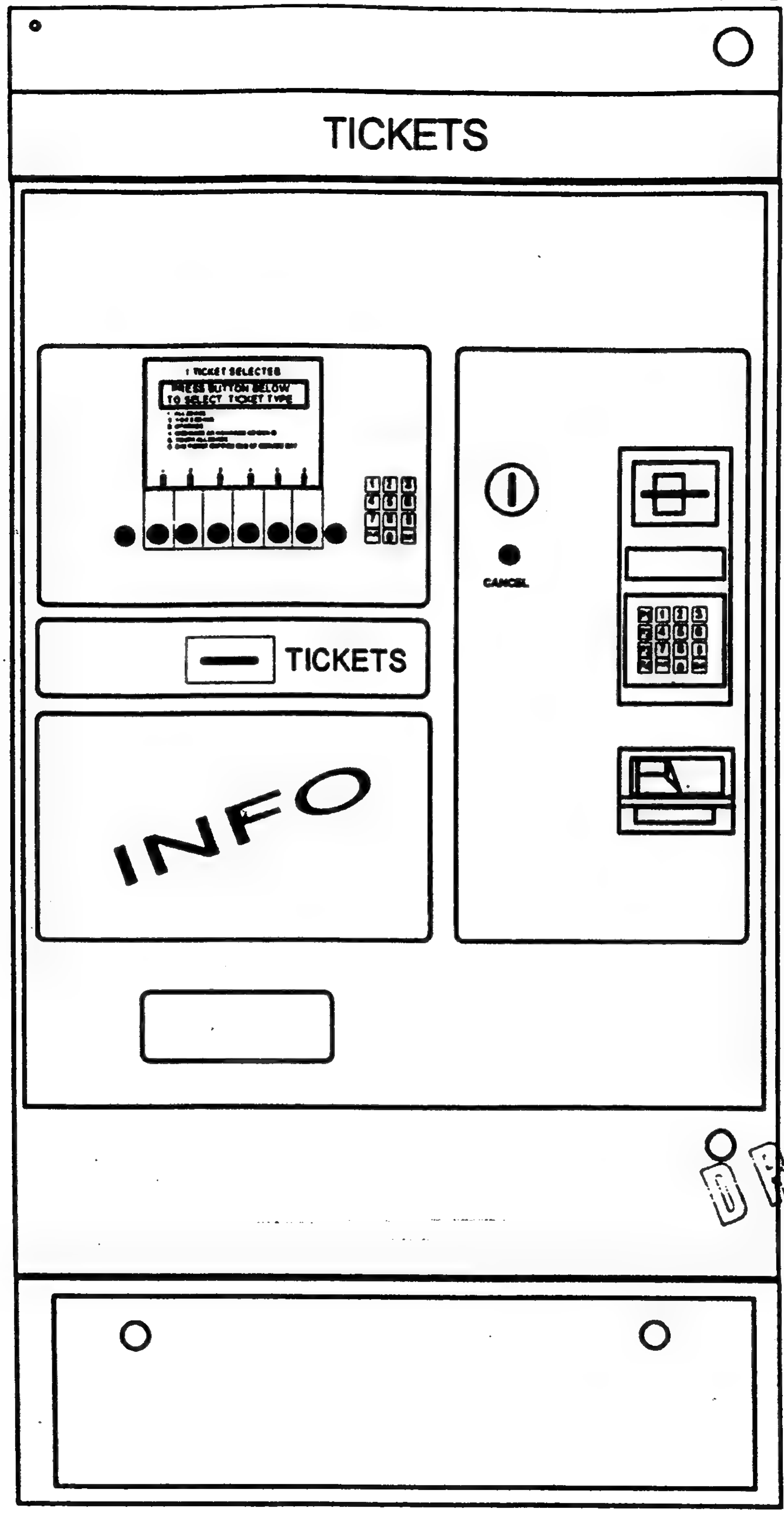
MBTA PROPOSED FUTURE FARE COLLECTION - TICKET VENDING MACHINE



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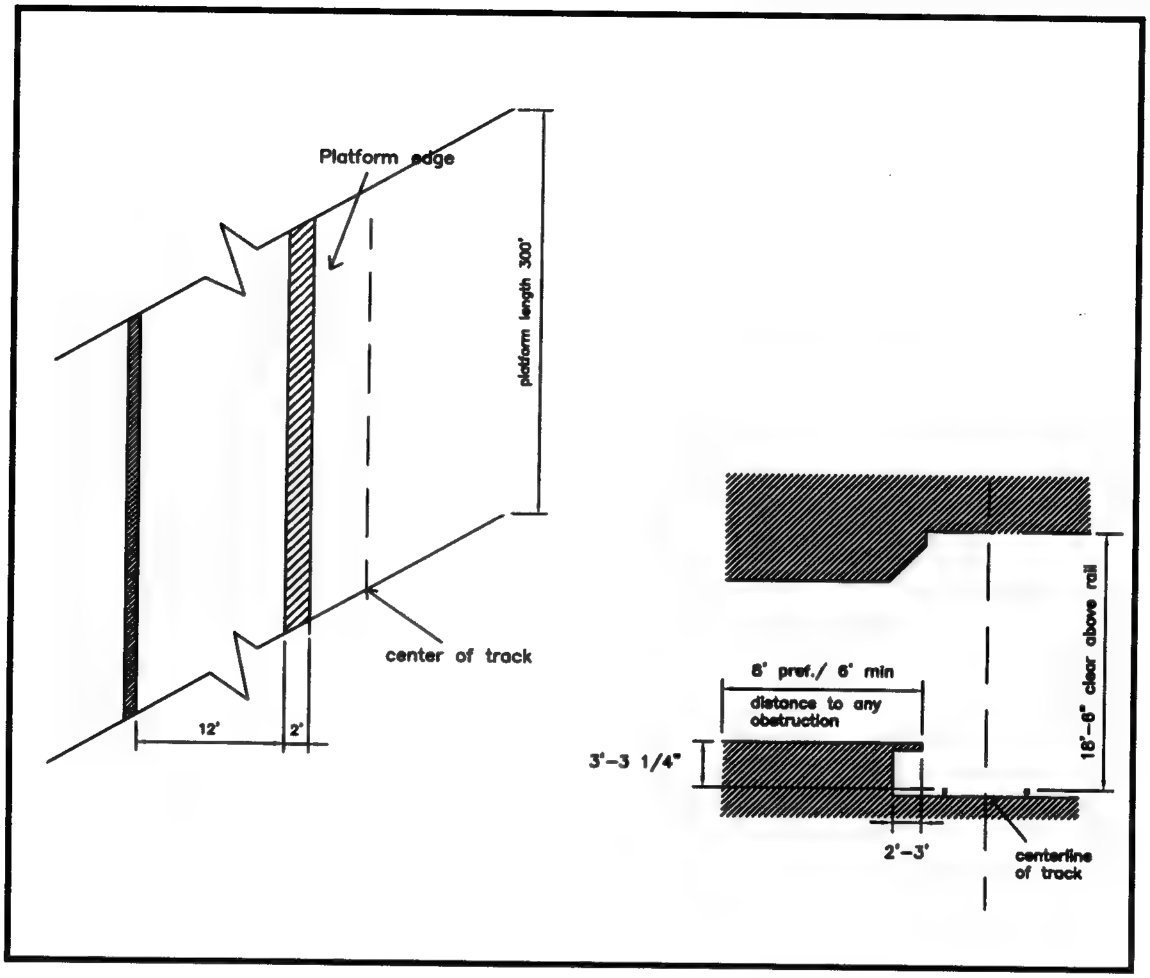
Platform Dimensions



Analysis

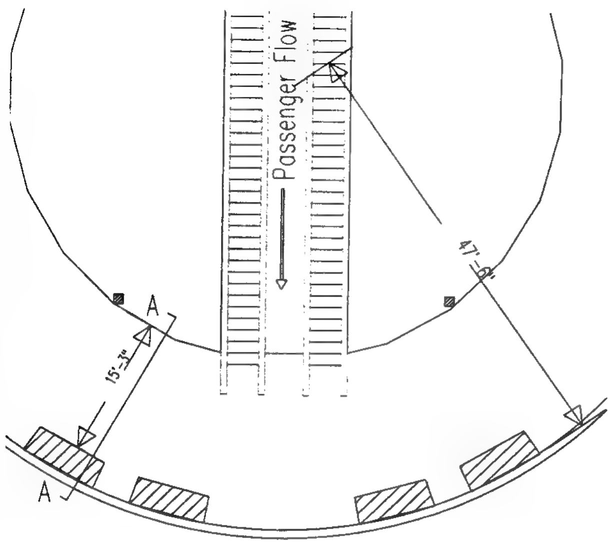
The MBTA has programmed the platform at the new Airport Station to be 300' long, as the Blue line will be upgrading to 6 car trains in the future. Furthermore the Station must provide 18'-6" clearance above the top of rail for the catenary system as the trains will be running on catenary power. A 2' warning track of a bright yellow is required by MBTA guidelines at the platform edge.

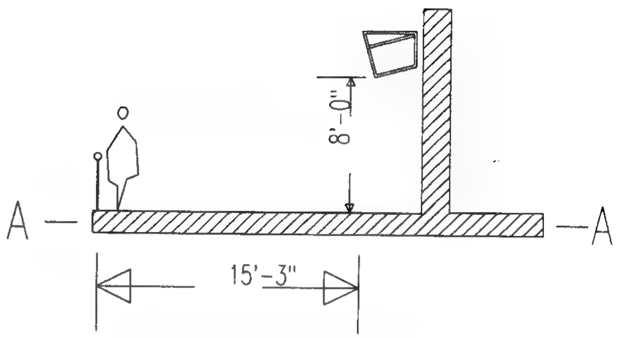
MBTA guidelines also call for a minimum platform depth of 8' prefered, 6' minimum to any solid obstruction. The newer MBTA stations all exceed these minimal requirements substantially. The following table summarizes the platform depths for the stations reviewed in the WFA case studies for this project.

Station	minimum depth	typical depth	
Harvard Square	16'	24'	
Alewife	6'	17'-5"	(35' serves parallel tracks)
Ruggles	8'	15'	(30' serves parallel tracks)
North Station	11'	12'	

Passenger Information Systems

South Station Bus Terminal





Who installed it?

The passenger information system at South Station Bus Terminal was installed by **Sisco Systems** (of Hingham, MA) at two points in the Bus Terminal: the ground level lobby at the base of the stairs and escalators and in the rotunda at the top of the escalators. In the ground level lobby, the monitors are stacked in steel frames which have two rows of 4 each. In the rotunda there are four frames each holding a single row of 4 monitors.

Who operates it?

The passenger information system is operated by the staff of the bus terminal. The bus companies have dial-up access (modem) to the computer system so that they can place their own listings. For those few companies which are too small to be computerized, the terminal staff enters the information for them.

Who owns it?

The system is the property of the MBTA

How do they list information?

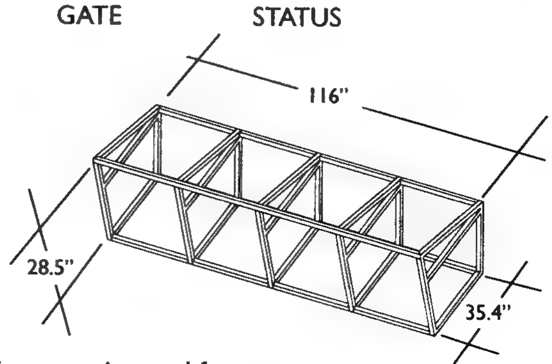
The monitors are divided into two groups (departure and arrival) of 8. Each monitor is formatted so as to provide 13 lines of listings. Thus the 16 monitors at South Station have a potential to list 104 arrivals and 104 departures. The listings are organized into 6 fields:

COMPANY TRIP # TIME TO GATE STATUS

(The "TO" field lists the destination)

Technical Specifications

monitor weight	150 lbs. each
monitor size	20" x 24" x 20" deep
power consumption	?



Four monitor capacity steel frame

Passenger Information Systems

The Massport Flight Information System

In 1986 Massport awarded a contract to International Display Systems Inc. (of Dayton Ohio), for flight information to be used by staff at Massport information booths. The system uses an IBM PC to process information from the computer systems of the various airlines. Each airline generates its own flight information in a format of its choosing and then transmits the data as preprocessed pages to the Massport system. The Massport system does not alter the layout of the data, for both practical and liability issues.

The Massport system has 49 pages of information. The large airlines provide several of those pages, whereas the small ones use only one. It is not suitable for public use as currently configured because it lacks basic user-friendly features. For example, it only has three keys for input and the operator must either parse through the entire set of pages or enter a specific page code from a printed "cheat sheet" which is updated several times a year.

The MBTA Airport Flight Schedule Information: Feasibility Study proposed that the Massport system be converted into a more user-friendly kiosk scheme. Although user-friendly, the new kiosks would preserve the basic feature of the Massport system: preformatted pages from the individual airlines. The kiosks are an excellent idea for helping people with specific questions, but to give a large number of people information quickly there needs to be a broader display.

Passenger Information Systems

The New MBTA Airport Station

Logan Airport Airlines

Airline	Terminal
Aer Lingus	E
Air Alliance	E
Air Atlantic/Canadian Partner	E
Air Canada	E
Air Nova	E
Alitalia	D
American	B
American Eagle	B
ATA	E
America West	B
British Airways	E
Business Express	C
Canadian	B
Cape Air	A
Colgan Air	A
Comair	C
Continental	A
Delta Air Lines	C
Delta Shuttle (LaGuardia, N.Y. only)	B
Eastwind	A
Frontier	A

Airline	Terminal
Icelandair	E
KLM	E
Kiwi	A
Korean Air	E
Lufthansa	E
Midway Airlines	B
Midwest Express	A
Northwest	E
Olympic	E
Qantas	B
Sabena	C
Spirit Airlines	A
Swissair (Int'l Arrival Only)	C
TAP Air Portugal	E
TWA (except int'l arrivals)	C
United/United Express	C
US Airways Shuttle (LaGuardia, N.Y.)	A
US Airways/US Airways Express	B
Air Tran	D
Virgin Atlantic Airways	B

In order to accomodate more users, there might be a large display of monitors arrayed at the MBTA Airport station, which arrays all the information in one glance like the display of a railroad station. The flight monitors could be an attractive feature of the new airport station, enriching the experience of its lobby by making a connection to its unique mission: serving airport passengers.

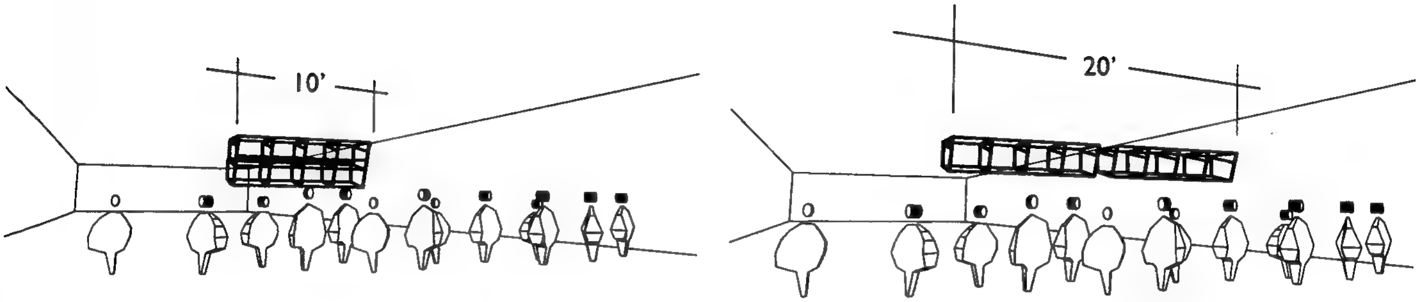
As shown on a previous page, the bus terminal at South Station uses just such a bank of monitors. The problem is that there are 42 airlines flying in and out of Logan Airport. Even if there was only one monitor per airline scheme, besides being very expensive, it would be cumbersome to read. On the other hand, if the information isn't available at a quick glance would people really want it? They will be at their ticketing desk soon enough, where all the information is listed for their airline.

If 42 is too unwieldly a number of monitors, the list could be reduced to the most popular airlines. This would ensure that most people who wanted to find their flight information, could do so at a glance. Using the South Station bus terminal (with its 16 monitors) as a guide, the next page shows a 14 major airlines. This is just a suggested list, to show how the information could be reduced to a workable amount.

Airport Station
Component Analysis
Wallace, Floyd, Associates, Inc.

Passenger Information Systems

The New MBTA Airport Station



Airline Terminal

Air Canada	E
American	B
America West	B
British Airways	E
Continental	A
Delta Air Lines	C
Lufthansa	E
Midwest Express	A
Northwest	E
Swissair	C
TWA	C
United/United Express	C
US Airways/US Airways Express	B
Virgin Atlantic Airways	B

This smaller number of airlines could easily be accommodated with a number of monitors similar to those at South Station. If arrayed alphabetically, with the airline's name and logo displayed above the monitor, it would be quite easy for people to find their information quickly and move on. Furthermore the technical issues do not seem significant obstacles. Because there already is a flight information system gathering the data from the airlines, it should be a relatively straightforward matter to display that information unaltered.

The illustrations above show two possible configurations of 8 monitors, they are not meant to show a specific architectural space. The dissemination of flight information is a difficult challenge as the data set is broad but shallow: everyone wants to know the same thing -"when is my flight." The strength of the proposal for flight monitors, is that such a bank of information mirrors the form of the data set. It maximizes the efficiency of the transfer of information from the Massport Flight Information System to the airline passengers.

Appendix D. Airport Station MBTA Program Comparisons

Airport Station
Program Comparisons
Wallace, Floyd, Associates Inc.

In order to facilitate the development of the program for the new Airport Station, WFA analyzed the programs of five MBTA stations deemed somewhat similar based on their estimated ridership, function and intermodal connections.

Each of the areas listed below was measured from the architectural drawings for each of the comparable stations. For the sake of the study, we included every space listed in each station, regardless of its relevance to the Airport Station program. The areas estimated for the mechanical, electrical, communications and other systems were determined in consultation with the appropriate subconsultants (T. K. Dyer for communications and signal systems, R. W. Beck for traction power, and S.A.R. for station M.E.P.). Those areas with 'NA' listed under the 'Proposed Airport Station' column indicate our assumption that the space will not be required at the new station.

The final column offers a preliminary designation as to the side of the train tracks each element belongs: "OB" stands for the outbound side and "IB" stands for the inbound side. Note that the primary entrance for both pedestrian and vehicular arrival occurs on the outbound side of the tracks.

The ridership figures came from MBTA Rail Ridership Counts, seven year average '88-'95

	Alewife	Harvard Sq.	North Sta.	Ruggles	Forest Hills	Airport Station (proposed)	
Average Daily Ridership	16974	33780	21892	13198	23642	11,800*	

*CTPS ridership projection for the year 2010

LOBBY RELATED FUNCTIONS

Public Spaces

	Alewife	Harvard Sq.	North Sta.	Ruggles	Forest Hills	Airport Station (proposed)	
Unpaid Lobby	9885	4500	2230	4800	6475	**3000**	OB
Secondary Lobby (inc. Fare Collection)	0	3900	1530	0	1315	**1000**	IB
Entry/ Landing	0	2200	1875	7525	0	**NA**	
Concession/ Commercial	2350	1440	0	865	735	**600**	OB
Public Men's Toilets	200	100	0	90	100	**NA**	OB
Public Women's Toilets	200	85	0	90	135	**NA**	OB
Primary Fare Collection	3170	3035	2690	1980	2685	**2900**	OB
number of turnstiles	**20**	**15**	**16**	**9**	**11**	**12--15**	
Subtotal	15805	15260	8325	15350	11445	**7500**	

F.H. = commuter rail
N.S.=includes small entry houses on grade
A.S.- interim w/ 2 booths or one double booth

CIRCULATION

	Alewife	Harvard Sq.	North Sta.	Ruggles	Forest Hills	Airport Station (proposed)	
Unpaid Circulation	0	0	0	0	0	**1400**	
Unpaid Vertical Circulation	0	0	0	0	0	**460**	
Public Paid Circulation	3530	880	2210	2240	670	**2400**	OB/IB
Paid Vertical Circulation*	4070	2275	7075	4910	2790	**2680**	OB/IB
stairs	**9**	**6**	**11**	**10**	**5**	**2**	
escalators	**3**	**5**	**8**	**4**	**4**	**4**	
elevators	**4**	**1**	**4**	**4**	**3**	**2**	
Back of House Circulation	1830	1850	460	45	1265	**1000**	OB/IB
Subtotal	9430	5005	9745	7195	4725	**7940**	

A.S. min. & Add'l elev. + 2 add'l stairs req'd for unpaid crossover
*includes stairs, escs., elevs. elev machine rooms, run-offs
*includes 3 ramps

Airport Station
Program Comparisons
Wallace, Floyd, Associates Inc.

	Alewife	Harvard Sq.	North Sta.	Ruggles	Forest Hills	Airport Station (proposed)		
Staff Related								
Porter's Room #1	70	100	110	80	125	**80**	OB	
Porter's Room #2	0	65	65	85	0	**80**	IB	
Train Operator's Room	0	0	210	290	0	**NA**	OB/IB	
Starter's Booth #1	100	105	110	35	0	**70**	OB	
Starter's Booth #2	0	0	90	0	0	**70**	IB	
Staff Men's Toilet	135	135	125	0	110	**65**	OB/IB	
Staff Women's Toilets	135	85	125	0	105	**65**	OB/IB	
CCTV Hub Space	0	0	0	0	0	**0**	OB	**A.S.**- new security program located within F.C. #
Safe Room	90	410	150	90	70	**NA**	OB	
Police substation	0	0	0	0	200	**100**	OB	
Train Crew's Lobby	505	0	0	0	0	**NA**	IB	
Kitchen	40	0	0	0	0	**NA**	IB	
Men's Locker Room	110	0	0	0	45	**NA**	IB	
Men' Toilets	195	0	0	35	0	**NA**	IB	
Women's Locker Rm	100	0	0	0	25	**NA**	IB	
Women's Toilets	150	0	0	50	0	**NA**	IB	
Subtotal	1630	900	985	665	680	**530**		
Service Related								
Communications Room	280	340	265	210	325	**280**	OB/IB	
Unit Substation Room	1410	1375	980	1700	1740	**960**	OB	**A.S.**- for converting 13.8kV power from traction substation
Fan Room(s)	3065	6920	0	1190	0	**NA**		
Lamp Room	145	0	65	170	65	**NA**		
Mech Equipment Room	660	230	590	0	0	**200**	OB	**A.S.**- Space allocation for split system HVAC
Blast Shafts	0	2200	0	0	0	**NA**		
Telephone Closet	40	90	0	0	0	**NA**		**A.S.**- in Communications Rm
Electrical Room	845	870	1670	50	0	**400**	OB/IB	
Invertor Room	165	0	0	0	0	**NA**		
Battery Room	380	170	70	265	255	**200**	IB	**AW** - actually named station electrical rm
Emergency Gen Room	430	305	210	410	550	**275**	IB	
Electrical Equip Room*	0	150	60	110	0	**150**	IB	* typically a workroom for electrical equipment
unassigned spaces					1915	**NA**		
Storage	145	1395	0	0	155	**200**	OB/IB	
Sewage Ejector Room	100	125	735	0	0	**NA**		
Sump Pump Room	0	345	0	0	0	**100**	OB/IB	
Hose Room	0	25	0	0	0	**NA**	OB	
Emergency Control Room	110	100	0	0	0	**70**	OB	
Meter Room	50	0	70	215	0	**70**	OB/IB	
Sprinkler Pump Room	0	0	0	0	0	**NA**	OB	
Subtotal	7825	14640	4715	4320	5005	**2905**		

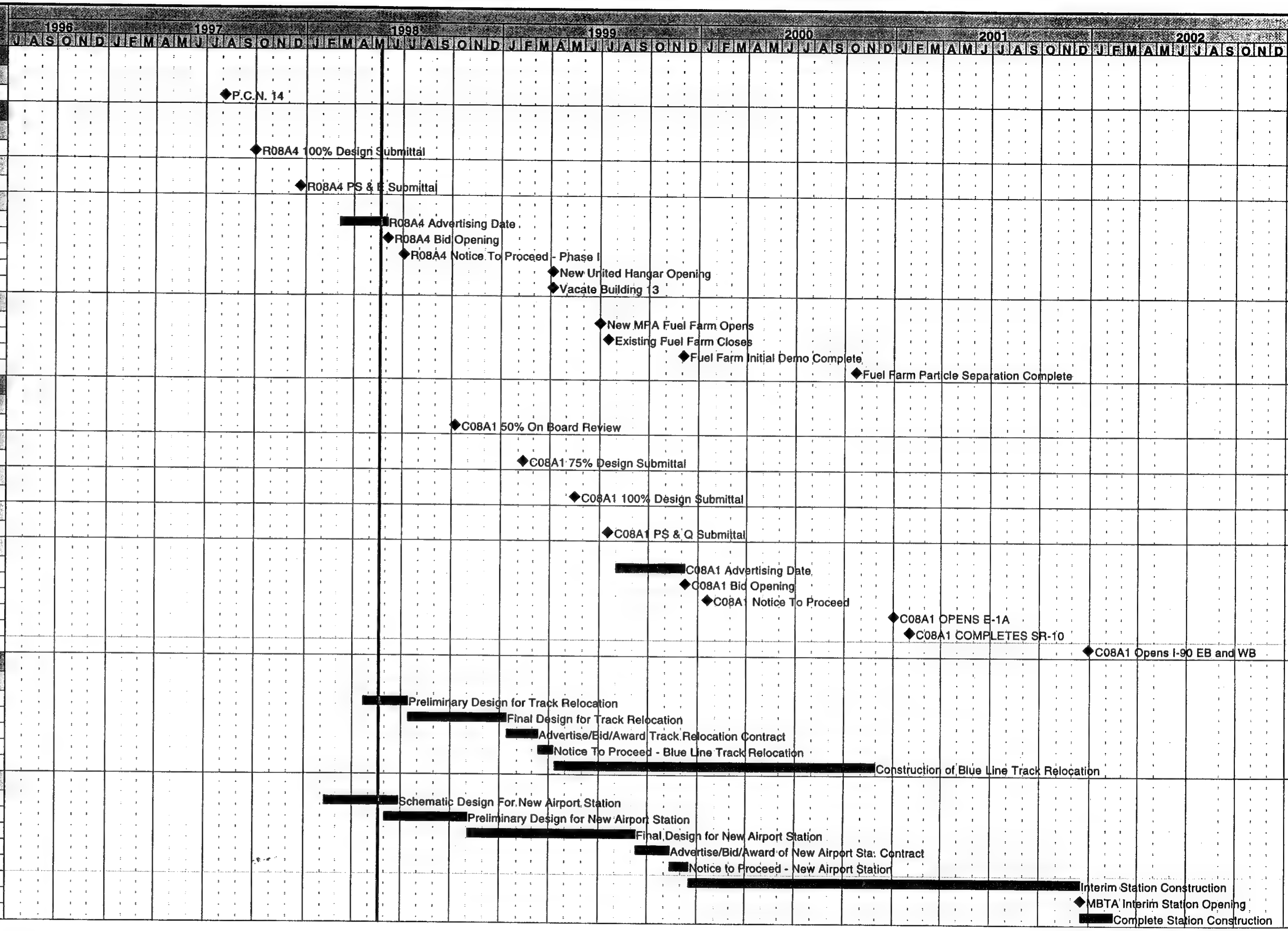
Assuming separate substation and CIHs the following are NA:	**Alewife**	**Harvard Sq.**	**North Sta.**	**Ruggles**	**Forest Hills**	**Airport Station**
Central Instrument Room	865	1195	0	830	0	**NA**
Power Room	0	115	0	0	0	**NA**
DC Traction	25	0	0	0	0	**NA**
Switch Room	0	0	210	0	0	**NA**
Signal Relay Room	0	0	920	480	0	**NA**
AC/DC Switch	0	0	170	0	0	**NA**
Primary Switching Sta.	0	0	1220	0	0	**NA**
Signal Equipment	0	0	265	0	285	**NA**
Subtotal	890	1310	2785	1310	285	**NA**

R - Called Utility Lounge

NET PROGRAMMED AREA OF STATION (not including platform area)	**35580**	**37115**	**26555**	**28840**	**22140**	**18875**
GROSS AREA of STATION (not including train platforms)	**39,290**	**37,175**	**31,315**	**30,775**	**27,955**	**19820**
Deduct Not Applicable S.F.	**5405**	**12720**	**4725**	**10280**	**420**	
Comparable Square Footage	**33,885**	**24,455**	**26,590**	**20,495**	**27,535**	**19820**

Appendix E. Interagency Draft Critical Milestones Schedule

Act ID	Activity Description	Orig Dur	Early Start	Early Finish
D008A: EAST BOSTON AIRPORT / RT. 1A INTERCHANGE				
50% DESIGN PHASE				
A0001	P.C.N. 14	0		04AUG97A
R08A4: ADVANCED DEMOLITION				
100% DESIGN PHASE				
A4001	R08A4 100% Design Submittal	0		30SEP97A
PS & Q PHASE				
A4002	R08A4 PS & E Submittal	0		22DEC97A
CONSTRUCTION PHASE				
A4003	R08A4 Advertising Date	62	06MAR98A	02JUN98
A4004	R08A4 Bid Opening	0		02JUN98
A4005	R08A4 Notice To Proceed - Phase I	0	03JUL98*	
A4010	New United Hangar Opening	0	05APR99*	
A4011	Vacate Building 13	0	05APR99*	
MASSPORT FUEL FARM DEMOLITION				
A4006	New MPA Fuel Farm Opens	0	01JUL99*	
A4007	Existing Fuel Farm Closes	0		15JUL99*
A4009	Fuel Farm Initial Demo Complete	0		01DEC99*
A4008	Fuel Farm Particle Separation Complete	0		20OCT00*
C08A1: RT. 1A INTERCHANGE - INITIAL ROADWAYS				
50% DESIGN PHASE				
A1001	C08A1 50% On Board Review	0		07OCT98*
75% DESIGN PHASE				
A1002	C08A1 75% Design Submittal	0		09FEB99*
100% DESIGN PHASE				
A1003	C08A1 100% Design Submittal	0		17MAY99*
PS & Q PHASE				
A1004	C08A1 PS & Q Submittal	0		15JUL99*
CONSTRUCTION PHASE				
A1005	C08A1 Advertising Date	91	02AUG99*	06DEC99
A1006	C08A1 Bid Opening	0		06DEC99
A1007	C08A1 Notice To Proceed	0	17JAN00*	
A1010	C08A1 OPENS E-1A	0	01JAN01*	
A1011	C08A1 COMPLETES SR-10	0		01FEB01*
A1008	C08A1 Opens I-90 EB and WB	0	31DEC01*	
MBTA				
BLUE LINE TRACK RELOCATION				
M0001	Preliminary Design for Track Relocation	61	20APR98A	13JUL98
M0002	Final Design for Track Relocation	131	14JUL98	12JAN99
M0003	Advertise/Bid/Award Track Relocation Contract	42	13JAN99	11MAR99
M0004	Notice To Proceed - Blue Line Track Relocation	21	12MAR99	09APR99
M0005	Construction of Blue Line Track Relocation	427	12APR99	28NOV00
NEW AIRPORT STATION				
M0006	Schematic Design For New Airport Station	88	09FEB98A	26JUN98
M0007	Preliminary Design for New Airport Station	111	01JUN98	02NOV98
M0008	Final Design for New Airport Station	222	03NOV98	08SEP99
M0009	Advertise/Bid/Award of New Airport Sta. Contract	46	09SEP99	11NOV99
M0010	Notice to Proceed - New Airport Station	25	12NOV99	16DEC99
M0011	Interim Station Construction	522	17DEC99	17DEC01
M0012	MBTA Interim Station Opening	0		17DEC01*
M0013	Complete Station Construction	44	18DEC01	15FEB02



Project Start	07JUL97
Project Finish	02JAN03
Data Date	22MAY98
Run Date	22MAY98

Early Bar
Progress Bar

MU04

FST/Rizzo - JOINT VENTURE

DRAFT CRITICAL MILESTONES

UPDATE #4 - MAY 26, 1998

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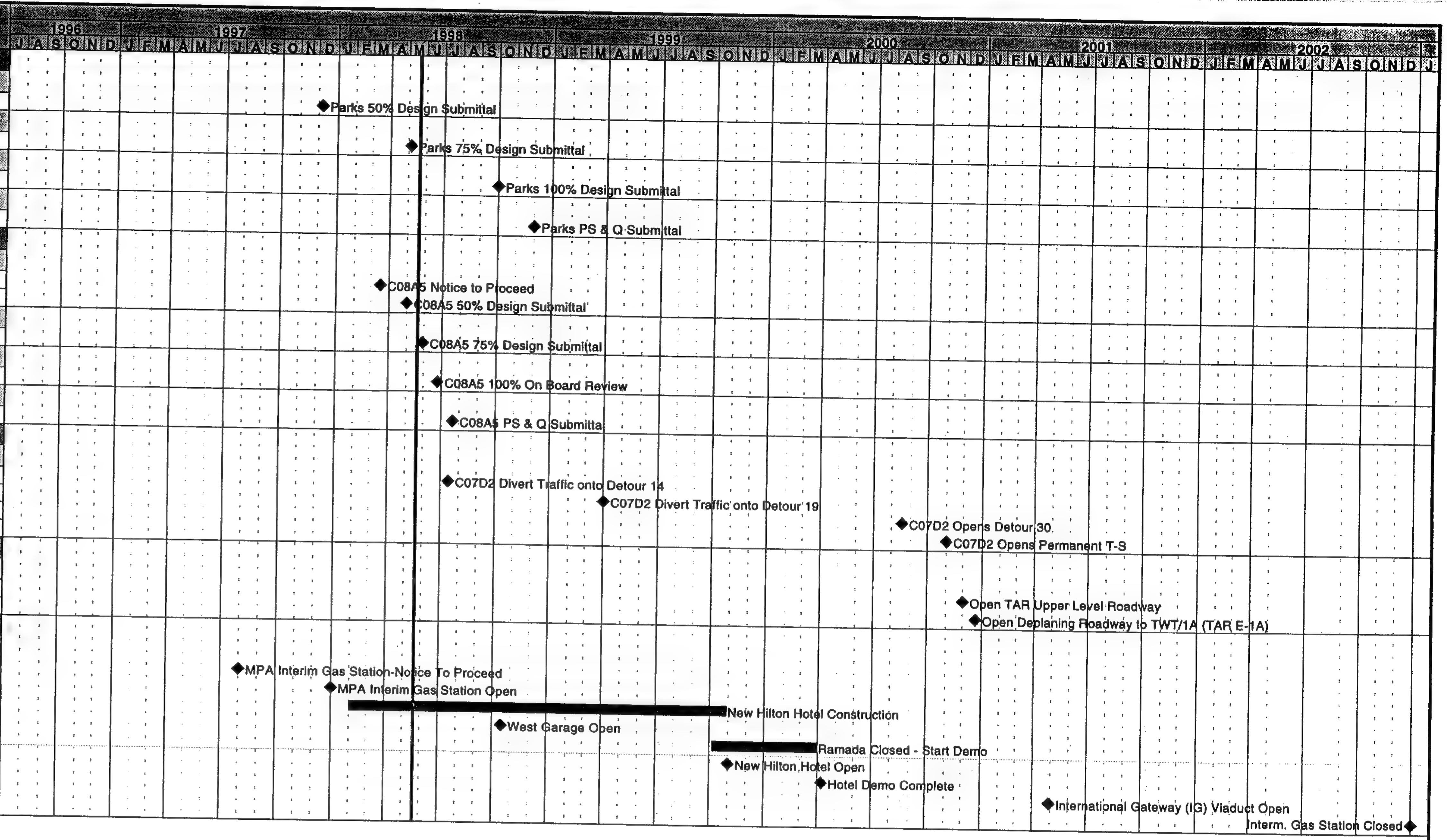
D007D / D008A / TAR / MBTA PARTNERING

Date	Revision	Checked	Approved

Act ID	Activity Description	Orig Dur	Early Start	Early Finish
PARKS CONTRACT				
50% DESIGN PHASE				
A3001	Parks 50% Design Submittal	0		05DEC97A
75% DESIGN PHASE				
A3002	Parks 75% Design Submittal	0		04MAY98A
100% DESIGN PHASE				
A3003	Parks 100% Design Submittal	0		30SEP98*
PS & Q PHASE				
A3004	Parks PS & Q Submittal	0		30NOV98*
C08A5: ADVANCED DETOUR ROADS				
50% DESIGN PHASE				
A5005	C08A5 Notice to Proceed	0	16MAR98A	
A5001	C08A5 50% Design Submittal	0		01MAY98A
75% DESIGN PHASE				
A5002	C08A5 75% Design Submittal	0		29MAY98*
100% DESIGN PHASE				
A5004	C08A5 100% On Board Review	0		23JUN98*
PS & Q PHASE				
A5003	C08A5 PS & Q Submittal	0		20JUL98*
C07D2: I-90 LOGAN AIRPORT INTERCHANGE				
CONSTRUCTION PHASE				
D2003	C07D2 Divert Traffic onto Detour 14	0	15JUL98*	
D2005	C07D2 Divert Traffic onto Detour 19	0	01APR99*	
D2001	C07D2 Opens Detour 30	0	18AUG00*	
D2002	C07D2 Opens Permanent T-S	0	01NOV00*	
TAR: TERMINAL AREA ROADWAYS				
CONSTRUCTION PHASE				
T0003	Open TAR Upper Level Roadway	0		29NOV00*
T0002	Open Deplaning Roadway to TWT/1A (TAR E-1A)	0		21DEC00*
LOGAN 2000				
CONSTRUCTION PHASE				
L0005	MPA Interim Gas Station-Notice To Proceed	0	01AUG97A	
L0006	MPA Interim Gas Station Open	0	01JAN98A	
L0001	New Hilton Hotel Construction	455	02FEB98A	29OCT99
L0004	West Garage Open	0	16OCT98*	
L0003	Ramada Closed - Start Demo	128	06OCT99	31MAR00
L0002	New Hilton Hotel Open	0	01NOV99	
L0007	Hotel Demo Complete	0		06APR00
L0009	International Gateway (IG) Viaduct Open	0		27APR01*
L0010	Interm. Gas Station Closed	0		02JAN03*



Project Start	07JUL97	Early Bar	MU04
Project Finish	02JAN03	Progress Bar	
Data Date	22MAY98		
Run Date	22MAY98		

FST/Rizzo - JOINT VENTURE

DRAFT CRITICAL MILESTONES

UPDATE #4 - MAY 26, 1998

Sheet 2 of 2

D007D / D008A / TAR / MBTA PARTNERING

Date	Revision	Checked	Approved

Appendix F. CA/T Notice of Project Change and MEPA Letter

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street, Boston, MA 02202

ARGEO PAUL CELLUCCI
GOVERNOR
TRUDY COXE
SECRETARY

FILE COPY
5-13-98

Tel: (617) 727-9800
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http://www.magnet.state.ma.us/envir

May 13, 1998

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE NOTICE OF PROJECT CHANGE

PROJECT NAME	: Central Artery/Tunnel Project (CA/T)
PROJECT MUNICIPALITY	: Boston (East Boston)
PROJECT WATERSHED	: Boston Harbor (Mystic)
EOEA NUMBER	: 4325
PROJECT PROPONENT	: Massachusetts Highway Department (MHD)
DATE NOTICED IN MONITOR	: December 24, 1997

As Secretary of Environmental Affairs, I have reviewed the Notice of Project Change (NPC) submitted on this project pursuant to the Massachusetts Environmental Policy Act (M.G.L. c.30, ss.61-62H) and Section 11.17 of the MEPA regulations (301 C.M.R. 11.00), and hereby determine that it does not require the preparation of a Supplemental Environmental Impact Report.

This NPC has attracted substantial public attention and a great deal of thoughful input from concerned citizens and interested advocacy groups. I have paid close attention to all of this input during the extended review of this NPC and have required the proponent (and MBTA and Massport) to prepare and submit substantial additional information to respond to these concerns.

According to the NPC, the project change involves various changes to surface roads at Logan Airport, and the relocation of the MBTA Airport Station approximately 480 feet north of the current location. This NPC presents a conundrum from an environmental and community perspective when compared to the original 1991 design.

Although the substantive comments received on the NPC are generally favorable (especially those from City and Commonwealth agencies), those areas of project design that have generated concerns (and that I highlight above) are addressed in more detail below.

Ramp Depression

Several commentors have asked that I require MHD to study further the feasibility of depressing the ramps connecting the Sumner and Callahan Tunnels with Route 1A. While I agree that depressing the tunnels/Route 1A interchange area would help lessen community impacts from both existing and proposed transportation infrastructure, MHD has adequately studied this option for purposes of MEPA review and I accept MHD's conclusion that depressing the interchange area is not feasible as part of the CA/T project for scheduling and cost reasons. Please note that I have expressly considered the feasibility of depressing certain viaduct elements of the interchange in the context of preserving a cross-platform transfer at Airport Station, as explained below.

Both the Draft and Final Supplemental EIRs for the Project as a whole concluded that the depression of the interchange area was infeasible as part of the CA/T project. At the same time, the current NPC design reduces the amount of elevated roadway from the amount proposed in the 1993 NPC and it moves it farther away from residences and public open spaces. As a result, the potential obstacles encountered if MHD considers depression of the interchange area in the future are reduced.

Airport Station Relocation

The relocation of Airport Station to a point 480 feet north of the current location and redesign of the surface roads has considerably improved parkland by creating over an acre of additional open space and improving pedestrian and visual access from the neighborhood. It will also result in a more efficient shuttle bus system between Airport Station and the airport

terminals. As a result, travel time from the Blue Line to the terminals is reduced (although travel time on the Blue Line from Boston is slightly increased). These changes are not expected to significantly affect transit ridership levels. The NPC design results in the loss of a cross-platform connection between the Blue Line and the shuttle bus system in the inbound direction.

<u>Cross-Platform Connection</u>

The loss of the inbound cross-platform connection has generated the most concern of any aspect of the NPC. I agree with those commentors who maintain that a cross-platform transfer from the Blue Line to the Massport buses represents a design inherently superior to a grade-separated transfer, independent of any ridership modeling results. (In fact, previous documentation for both the CA/T project and several Massport filings had stressed the benefits of a cross-platform connection at Airport Station.) I also note that the ridership models used by the CA/T project to determine the impacts of the loss of the inbound cross-platform transfer were based on Massport surveys of enplaning (rather than deplaning) passengers (although I understand the data collection limitations that impose this constraint). I also note that the Logan Generic EIR and Annual Updates provide mode-split projections and targets; I fully expect Massport to adhere to its previous commitments, regardless of the loss of in-bound cross-platform transfer.

For all of the above reasons, I have actively solicited additional comments on the cross-platform transfer issue, and have conducted a thorough and detailed review of whether the existing or an alternative station design or location would allow for an inbound cross-platform transfer. I have analyzed the issue within the following parameters: 1) I am not assuming depression of the tunnels interchange area, although I have analyzed the feasibility of a cross-platform transfer assuming limited depression of individual viaduct elements as appropriate; and 2) I am assuming that the Robie parcel is an infeasible location for the relocated Airport Station, because of severe

negative impacts on MBTA Blue Line operations (from the resultant proximity of the relocated station to the Wood Island Station and the consequent impact on travel speed and time), as well as conflicts with the three-way land swap necessary to develop the Bremen Street buffer park. These are reasonable constraints, viewed within the context of the purpose of MEPA reviews and the policy decision on the part of the transportation agencies not to pursue depression of the tunnel interchange area.

Commentors have suggested several thoughtful design alternatives which would allow the incorporation of an inbound cross-platform transfer. However, each alternative suggested has either produced unacceptable operational impacts on the MBTA, or else has introduced design constraints on the project area that would tend to increase travel time and negate any benefits derived by the cross-platform transfer. The NPC has demonstrated the infeasibility of an inbound cross-platform transfer and, on balance, the NPC design is environmentally superior to the base design, despite the loss of the cross-platform transfer.

I am not requiring additional MEPA review of the cross-platform transfer issue beyond the significant amount of analysis which has already taken place. However, I ask that the proponent (and other transportation agencies) keep an open mind on the issue during the process of final design. (A cross-platform compatible design may yet emerge without any of the drawbacks which have made previous designs infeasible.) If an unexpected opportunity emerges which allows the restoration of two cross-platform transfers (without producing unacceptable impacts in other areas), I urge the proponent to restore the cross-platform connection under those circumstances.

In summary, I agree wholeheartedly with those commentors who find that the loss of the inbound cross-platform connection is unfortunate. However, the NPC has adequately described the reasons for the design change, evaluated the trade-offs involved, and demonstrated that the modeled impact on transit ridership will not prove severe.

Airport Station Design

I am concerned that the relocated Airport Station be as airport user-friendly as possible. During the process of final design, MBTA should continue the process of coordination with other transportation agencies on options for minimizing the impact from the loss of the cross-platform connection such as the multiple escalators (suggested by the Oversight Committee), large elevators, fare collection systems which are maximally convenient to persons carrying luggage, and other appropriate measures.

I agree with the neighborhood activists who believe that the relocated Airport Station should be accessible and safe for nearby residents. Their comments have raised numerous concerns with station design, lighting, and signage. I will defer resolution of these issues to the process of final design, but MHD should continue coordination with community members and other agencies to address these design issues to the maximum feasible extent. MHD should also continue coordinating with the community and the Boston Parks Department regarding the appropriateness of landscaped buffers between Memorial Stadium and the redesigned airport roadway system.

MHD should also continue its efforts to ensure compatibility of CA/T design with the various options under consideration for the Urban Ring project, and should continue coordination with the MBTA to ensure that Airport Station design accommodates convenient transfers between the Urban Ring and the Blue line/shuttle bus system.

Bremen Street Park

Although not formally part of the NPC, the status of the Bremen Street park/open space continues to generate interest and concern. I reaffirm my determination in earlier Certificates that this open space is necessary mitigation for project impacts. Overall, the NPC has reduced environmental impacts from the Base Case, and has adequately documented the impacts and mitigation

associated with the project change. I am not requiring further MEPA review of the changes described in the NPC. MHD can resolve the outstanding concerns during the process of final design through continued coordination with other agencies and the effected community. I ask that MHD consider the comments received on the NPC during this process, and when updating its Section 61 findings for the CA/T project.

5/13/98
DATE

Trudy Coxe

Comments received :

12/18/97	Massachusetts Port Authority
12/18/97	Massachusetts Bay Transportation Authority
1/8/98	AIR, Inc./Conservation Law Foundation
1/12/98	Councillor Paul Scapicchio
1/12/98	Edith De Angelis
1/12/98	Central Artery Environmental Oversight Committee
1/13/98	Neighborhood of Affordable Housing
1/13/98	Sen. Robert Travaglini
1/13/98	Boston Water and Sewer Commission
1/14/98	Department of Environmental Protection (Boston)
1/15/98	Bicycle Coalition of Massachusetts
1/16/98	Boston Redevelopment Authority
1/16/98	T. Brent and Carolyn Banulis
1/20/98	Bremen Street Company (by J. Aloisi, Hill & Barlow)
1/20/98	Alternatives for Community & Environment
1/20/98	Boston Transportation Department
1/20/98	Boston Parks Department
1/20/98	Sen. Robert Travaglini
1/20/98	Artery Business Committee
1/21/98	Conservation Law Foundation
1/21/98	AIR, Inc. (by P. Koff, McGowan et al.)

EOEA #4325 NPC Certificate May 13, 1998

1/22/98	Edith De Angelis
1/22/98	Neighborhood of Affordable Housing
1/26/98	Boston Environment Department
2/6/98	Artery Business Committee
2/26/98	AIR, Inc. (by P. Koff, McGowan et al.)
3/9/98	Bremen Street Company (by J. Aloisi, Hill & Barlow)
3/11/98	Department of Environmental Protection (Boston)
3/12/98	Conservation Law Foundation
3/12/98	AIR, Inc. (by P. Koff, McGowan et al.)
3/16/98	Artery Business Committee
3/25/98	AIR, Inc. (by P. Koff, McGowan et al.)
3/26/98	AIR, Inc. to CA/T Project (by P. Koff, McGowan et al.)
4/2/98	AIR, Inc. (by P. Koff, McGowan et al.)
4/3/98	AIR, Inc. (by P. Koff, McGowan et al.)
4/14/98	Boston Environment Department

TC/ASP/asp

CENTRAL ARTERY/TUNNEL PROJECT

EAST BOSTON AREA

NOTICE OF PROJECT CHANGE

EOEA # 4325

December 15, 1997

CENTRAL ARTERY/TUNNEL PROJECT
EAST BOSTON AREA
NOTICE OF PROJECT CHANGE

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1 APPROVED CENTRAL ARTERY/TUNNEL PROJECT AND MASSACHUSETTS PORT AUTHORITY TERMINAL AREA ROADWAYS

1.1 Background

This Notice of Project Change ("NPC") describes proposed changes to surface roads at Logan International Airport, and describes the proposed relocation of the Massachusetts Bay Transportation Authority's ("MBTA") Blue Line Airport Station ("Airport Station"). No changes are proposed to the Massachusetts Highway Department's (the "MHD") Central Artery/Tunnel Project (the "CA/T Project", or the "Project") I-90 highway improvements, including the mainline entrance and egress for the airport, that were approved by the Massachusetts Secretary of Environmental Affairs' Certificates dated January 2, 1991 and August 16, 1993. Route I-90 between the airport's terminal area and Airport Station is shifted northerly within the transportation corridor of the base design to allow for a new airport service road, as described below.

The changes to surface roads are the result of a CA/T Project-Massachusetts Port Authority ("Massport") Interagency Task Force effort to review optimal interfaces between the CA/T Project and Massport's terminal area and infrastructure modernization plan, known as the "Logan 2000" program. The proposed relocation of Airport Station is the result of a series of meetings with the East Boston community, Massport, and the MBTA to address issues with the CA/T Project's 1991 approved design. The proposed design changes and their potential environmental impacts are compared to the impacts of the CA/T Project and Massport's prior approved designs.

1.2 Description of Surface Roads in Base Design

The CA/T Project's 1991 Final Supplemental Environmental Impact Statement/Report ("1991 FSEIS/R") describes the I-90/Logan Airport Interchange portion of the Project (the "1991 Design", see attached Figure 1 and 1991 FSEIS/R, Part I, Chapter 2, page 2-7). The I-90/Logan Airport Interchange will provide connections between the newly-constructed extension of I-90 and the airport terminals, as well as to airport service roads and existing streets.

A CA/T Project 1993 Notice of Project Change/Environmental Reevaluation ("1993 NPC") for the I-90/Logan Airport Interchange changes traffic circulation on the ramps forming the Interchange. The basic change is that traffic exiting the Ted Williams Tunnel (the "TWT") eastbound from South Boston and entering the Logan Airport roadway system will do so in a counter-clockwise movement ("Scheme CLV-5C"), rather than in a clockwise movement, as described in the 1991 FSEIS/R (see attached 1993 NPC Figure 3 "Proposed Design Refinements, (Scheme CLV-5C)", the "CLV-5C Plan"). This change was based on Massport's recommendation, and allows for a slight consolidation of the Interchange, requiring less right-of-way (see the 1993 NPC). Scheme CLV-5C also changes the trip for buses travelling from Airport Station to the airport terminals. Under the 1991 Design, buses leaving Airport Station exited onto Ramp 1A-A/D, merging with other traffic. Ramp 1A-A/D provided direct access to the airport terminals. Under Scheme CLV-5C, buses leaving Airport Station exited onto SR-2, to SR-1, to Ramp S-A to access the terminal area.

Within the area surrounded by the I-90/Logan Airport Interchange loop ramps, the 1991 Design includes a four-way intersection formed by the crossing of two ramps, Ramp T-S and Ramp 1A-S. This infield intersection is comprised of below-grade "boat sections". The traffic movements accommodated by this intersection are connections from the TWT to the airport surface road system, and connections to and from the Logan Airport North Service, and South Cargo and Southwest Service areas. Ramp T-S provides a connection for vehicles travelling eastbound on I-90 to Harborside Drive at Porter Street, providing access to Logan Airport's South Cargo Area, which includes office buildings and the Hyatt Hotel. Ramp 1A-S provides a connection to the South Cargo Area for travellers from Route 1A (both northbound and southbound), by way of Harborside Drive (see the CLV-5C Plan).

Also to be constructed as part of the CA/T Project is Logan Airport service road #1 (SR-1), which connects another airport service road, SR-2, to Harborside Drive, providing a surface connection between the north and south service/cargo areas of the airport. Drivers exiting the South Cargo Area and desiring to access Route 1A would use SR-1. In addition, drivers travelling southbound from the North Service Area destined for the South Cargo Area would use SR-1 (see the CLV-5C Plan).

Numerous other airport service roads are described in Massport's 1995 Final Environmental Impact Report/Environmental Assessment Supplement ("1995 FEIR/EAS") for its West Garage Project. This roadway network is comprised of roadways providing direct access to and egress from the airport terminals ("Terminal Area Roadways") and numerous airport service roads forming an internal Logan Airport roadway circulation system. Massport's service road #10 ("SR-10") connects SR-2 and the Terminal Area Roadways. The 1995 FEIR/EAS also describes reconfigured airport roadways providing connections between the proposed West Garage (a parking garage) and each terminal. The 1995 FEIR/EAS describes a planned airport roadway network that will connect to the roadways constructed as part of the CA/T Project (see the attached 1995 FEIR/EAS Figure III-15).

Together, the two approved designs (CA/T and West Garage projects) are referred to as the "Base Design" in this document (see Figure 2).

1.3 Description of Airport Station in Base Design

The CA/T Project's 1991 FSEIS/R describes improvements to the existing MBTA Blue Line Airport Station, including the construction of a new bus loop. The new at-grade bus loop would replace the existing elevated bus loop, and would connect to the internal Logan Airport roadway circulation system. In coordination with Massport's plans to modernize Logan Airport, the bus loop was designed to encircle the station, providing access to the out- and inbound train platforms and allowing for rail-bus transfers on the same level. Overall, the station and bus loop improvements described in the 1991 FSEIS/R were intended to provide an improved transfer between rapid transit service and the existing airport shuttle bus service, such as reducing the need to climb stairs, which would be beneficial to passengers carrying luggage.

A transfer whereby a passenger can simply walk across a level platform to connect to his/her next

mode of transportation is referred to as a "cross-platform" transfer. Such a rail-to-bus cross-platform transfer could have been achieved with the Project design by the acquisition of special buses with doors on the left side of the bus. In addition, reconstruction of Airport Station was required to allow for one-level operation. Corresponding changes at the airport terminals would be necessary to utilize these special buses. The Terminal Area Roadways and passenger dropoff and pickup areas at the terminals would need to be configured to accommodate passengers exiting and entering the buses from the left side. Such a configuration was contemplated under Massport's Logan Airport Modernization Program (LAMP), which anticipated construction of a central terminal. The LAMP program has been replaced with the Logan 2000 program, which plans improvements to the individual terminals. Left-door buses, thus, are no longer compatible with modernization plans for Logan Airport.

The acquisition of special buses with doors on the left side is no longer necessary. While a left-door bus was consistent with planning in 1990, it is not consistent with planning today. In its 1996 Annual Update to its Generic Environmental Impact Report (EOEA #3247), Massport describes its proposed Airport Intermodal Transit Connector ("AITC"). The AITC will replace the existing airport shuttle buses with state-of-the-art, low-floor, buses that are powered by alternative fuels. Passengers would exit and enter the buses on the right side, both at the MBTA Airport Station, and at the airport terminals. Under the Base Design, passengers then would cross in front of the bus going to, and coming from, the station.

Pedestrian access to Airport Station for the local community also was to be improved by a direct connection between the station and Bremen Street. This goal was determined to be unachievable with the 1991 Design due to the existence of the Route 1A corridor, highway viaduct structures, and surface roads between the station and Bremen Street. A crossing of this infrastructure would require a number of changes in grade, creating a pedestrian environment that was unacceptable to the community.

2 DESCRIPTION OF THE PROPOSED DESIGN CHANGES

2.1 Revised Surface Roads

The revised surface road design would modify the CA/T Project I-90/Logan Airport Interchange infield intersection, eliminate SR-1 and the Airport Station bus loop, realign Ramp T-S, and reconfigure a portion of Massport's Logan 2000 Terminal Area Roadway network, including adding a new service road. The revised design is referred to as the "NPC Design" in this document, and is shown on the attached Figure 3. The major changes between the Base Design and the NPC Design are:

<u>Ramp T-S</u> Ramp T-S will continue to provide the I-90 eastbound-to-Harborside Drive traffic movement. The ramp will be realigned to connect to SR-10 at an at-grade intersection, and the traffic movement will be modified by use of SR-10.

<u>SR-10</u> SR-10 will be widened from 2 to 4 lanes between SR-2 and the access road for Terminal A. In addition, 3 lanes of SR-10 will be extended over the TWT adjacent to the portal, to connect to Harborside Drive.

<u>SR-10 to Terminal A Roadway</u> The SR-10-to-Terminal A roadway will be slightly realigned to avoid any impact to the Terminal A airside area (i.e., land located on the side of the terminal with active aircraft use).

<u>SR-1</u> SR-1 will be eliminated, and the traffic movements shifted to the widened and extended SR-10. and to the new SR-14. Drivers from Logan Airport's North Service Area desiring to access the rental car or taxi pool areas, or the South Cargo or Southwest Service areas, now could use either SR-2 to SR-10 to Harborside Drive, or SR-2 to SR-14 to Harborside Drive.

<u>Ramp 1A-S</u> Ramp 1A-S will become a surface roadway (it is a boat section under the Base Design). Ramp 1A-S will continue to provide the same traffic movement; that is, the connection to the South Cargo Area for travellers from Route 1A (both northbound and southbound) by way of Harborside Drive.

<u>SR-14</u> SR-14 will be added within the existing transportation corridor. SR-14 will serve as an important connection for the current Massport and other buses, and future AITC buses, travelling between the airport and the new Airport Station (see section 2.2 below), resulting in reduced shuttle bus travel times compared to the Base Design. In addition, SR-14 will serve as an optional route for vehicles travelling between the North Service Area, the Southwest Service Area, and the South Cargo Area, and as a back-up route for emergency vehicles in the event SR-10 becomes impassable due to accidents, roadway repairs, or other causes.

<u>SR-2</u> The northerly portion of SR-2 will be extended in a northerly direction between the Blue Line railroad tracks and the Delta Reservations Building, to the

Prescott/Frankfort streets intersection.

Bus Loop The bus loop, which under the Base Design encircles the existing Airport Station adjacent to the west end of Memorial Stadium Park, will be eliminated. Airport Station will be relocated as described below in Section 2.2. The current Massport and other buses, and future AITC buses, will connect from the airport to the new Airport Station by using SR-2 and SR-14.

Several additional changes associated with the NPC Design are described below.

- A section of SR-2 is modified at the northerly end of SR-1 (see Figure 2). Under the Base Design, this section of SR-2 is a boat section (to connect to the SR-1 boat section). Under the NPC Design, this section of SR-2, like the remaining part of SR-2, is a surface roadway.
- The elimination of SR-1 allows for approximately 700 feet of the Airport-Egress-To-Route 1A ramp adjacent to Memorial Stadium Park to become a surface roadway under the NPC Design, as compared to being constructed on viaduct under the Base Design.
- About 1,000 feet of the Blue Line tracks to the north of the existing Airport Station will be realigned to accommodate the NPC Design, which includes the extension of SR-2 to the Prescott/Frankfort Streets intersection.
- Relocating Airport Station eliminates the need to underpin the existing Blue Line track during CA/T Project construction, reducing potential disruptions to Blue Line service.
- Relocating Airport Station also is expected to eliminate any need to temporarily use Wood Island Station during CA/T Project construction.
- A Project East Boston satellite maintenance facility identified in the 1991 FSEIS/R has been eliminated, as it has been determined that such a facility is not required.

The NPC Design's elimination of the below-grade boat section roadways improves driver visibility and sight distances, and simplifies construction of the I-90/Logan Airport Interchange. Lower roadway profiles will result in positive visual impacts. Shifting Route I-90 northerly within the transportation corridor of the Base Design does not preclude Massport's proposed People Mover project, nor the availability of a corridor to locate that project. Overall, the NPC Design's revised surface roads improve the efficiency of the Logan Airport roadway system, reduce the amount of construction needed, and respond to community concerns regarding potential park and community impacts from the location and use of the approved design's bus loop.

2.2 New Airport Station

Wood Island Station Concept. Over the past several years, through the CA/T Project's ongoing coordination with the East Boston community, the community has expressed objections to the Project's proposed bus loop at Airport Station. The Base Design locates the bus loop adjacent to the west end of Memorial Stadium Park. Residents expressed concerns about the proximity of the bus loop and its associated potential traffic, air quality, and noise impacts to the park, a heavily-used community resource. Also voiced as a concern was the safety of residents walking to and from the station, and to and from Memorial Stadium Park, while in close proximity to an active

bus loop. To address these concerns, the CA/T Project, in conjunction with the MBTA and Massport, proposed that airport passenger functions be shifted northerly to the Wood Island MBTA Station. This proposal required the construction of a new bus loop to connect Wood Island Station to the airport's internal roadway circulation system by use of SR-2 and SR-10. It also required extending the MBTA's third, electrified, rail from Airport Station to Wood Island Station. While this plan satisfied some East Boston residents, other residents of East Boston strongly opposed it, for largely the same reasons that the initial bus loop was opposed -- potential traffic, air quality, and noise impacts introduced to their neighborhood. In addition, concerns were expressed that passengers' trips to the airport terminals would be lengthened, and that, overall, the shift would not contribute to promoting use of public transit for trips to and from the airport. Objections based on safety concerns to extending the third, electrified, rail also were expressed. For these reasons, the proposal to shift air passenger operations to Wood Island Station was not pursued further.

Proposed New Airport Station. As the long-standing objections to the Base Design remained, MHD continued to review the Project design with the community to identify other possibilities for revising the bus loop design to satisfy community concerns. Through this review, it was determined that Airport Station could be reconstructed approximately 480 feet in a northerly direction, rather than be rebuilt at its existing location. Shifting the station eliminates the need to construct the bus loop at the western edge of Memorial Stadium Park. Instead, SR-14 will be constructed alongside the northern side of the park. Route I-90 will be shifted slightly to the north so that SR-14 will be within the existing transportation corridor. After demolition and removal of the existing Airport Station, this plan also adds over one acre of open space to the west end of Memorial Stadium Park.

It is not feasible to construct a bus loop to encircle the relocated Airport Station, providing cross-platform transfers in both travel directions. Such a design would require a crossing of the train tracks. An at-grade crossing of the tracks is not acceptable to the MBTA, and would not be feasible in this case, due to the existence of the third, electrified, rail. Alternatively, the crossing could be achieved by either tunneling beneath, or bridging over, the tracks. Such a design, however, would require grade changes that are not possible to achieve in the physical space within which the bus loop would need to be located.

The relocated Airport Station design provides a cross-platform transfer for those travelling outbound (from downtown Boston to Logan Airport) on the Blue Line. Passengers would alight at the new Airport Station, and exit the station onto a plaza area for pickup by current Massport and other buses, and future AITC buses, to the airport terminals and other facilities. Those travelling inbound (from points north of Logan Airport to the airport) on the Blue Line would alight at the new Airport Station and access the platform pickup area by using the station elevators or escalators to cross over the train tracks. Ridership studies show that over 90 percent of airport passengers on the Blue Line arrive at Airport Station from the outbound direction. Although the NPC Design does not provide a cross-platform transfer in the inbound direction due to design infeasibility, ridership analysis indicates that this does not affect ridership noticeably (see Section 3.2.1 below).

When presented to the community, the proposal of a "New Airport Station" to be located approximately 480 feet north of the existing station was received favorably by the majority of residents attending the presentation. Some community concerns remain, particularly regarding safety for the community users of the station. Questions were raised regarding the physical environment between Porter Street and the New Airport Station, and pedestrian access between the community and the station. In response to these concerns, MHD, working with the MBTA, has identified a connection between Bremen/Brooks Streets and New Airport Station that will be incorporated during the final design process.

Comments Suggesting Three Blue Line Stations. Several East Boston residents have expressed a desire for the Commonwealth to locate three Blue Line stations in the East Boston/Logan Airport area: the existing Airport Station, a new Airport Station on airport property to service air passengers; and, the Wood Island Station. MHD, the MBTA, and Massport, have considered this comment; however, it has been determined to be neither practical nor prudent. The distance between the three stations, particularly between existing Airport Station and a new Airport Station on airport property, is not great enough to permit optimal, safe, train operations. While this factor alone is sufficient for eliminating this suggestion from further consideration, there are three additional negative aspects to the three station concept. Ridership projections do not support three (four, including Maverick Station) such closely-spaced stations outside of downtown Boston. Increasing travel time by requiring additional train starts and stops could in fact result in a degradation of transit service. And, combining relatively low community use with relatively high airport passenger use (i.e., two, rather than three, stations) enhances the security of the airport station.

Overall, the proposed New Airport Station responds to long-standing community objections with the Project's approved 1991 Design, keeps airport functions within the airport, and adds open space on the west end of Memorial Stadium Park by removing the existing station and Project bus loop.

In addition, the NPC Design provides greater flexibility for MBTA planning projects, such as the Urban Ring Project. Under the Base Design, use of the bus loop was restricted. Under the NPC Design, general-purpose vehicle use of SR-14 will be permitted, thus allowing Urban Ring and other vehicles to connect to New Airport Station.

3 POTENTIAL CHANGES IN ENVIRONMENTAL IMPACTS

3.1 Right-of-Way, Land Use, and Visual Impacts

Right-of-Way. The NPC Design changes right-of-way requirements by modifying the I-90/Logan Airport Interchange infield intersection, eliminating SR-1 and the bus loop, realigning Ramp T-S, widening and extending SR-10, and relocating Airport Station. The NPC Design affects only lands owned by MHD, Massport, and MBTA. The agencies have agreed to cooperate and make available the right-of-way needed to implement the NPC Design.

Land Use. The NPC Design has no adverse impacts to Logan Airport airside areas. The revised SR-10 will traverse Massport's central development parcel, rather than be aligned adjacent to the parcel (see Figures 2 and 3). This revised design affects approximately one acre of the parcel, which is the site for a proposed replacement hotel (see EOEA #10746, Logan Hilton Joint Venture Replacement Hotel). The NPC Design is consistent with the hotel developer's plans. In addition, the NPC Design does not change the planned access road to the site. The realignment of Ramp T-S to connect to SR-10 will benefit the hotel by resulting in a shorter, more direct, trip to the hotel for those travelling from the Ted Williams Tunnel. The NPC Design has no greater effect on the existing Ramada Hotel than does the Base Design.

Visual Impacts. The NPC Design will have an overall positive change in visual impacts in both the I-90/Logan Airport Interchange area, and the Memorial Stadium Park area, as compared to the Base Design. In the Interchange area, eliminating certain boat sections from the infield intersection will reduce the scale of the Interchange and will simplify it. Under the Base Design, the I-90/Logan Airport Interchange area was to be a heavily landscaped "gateway" to the airport and the TWT. As compared to the Base Design, under the NPC Design due to the modifications to the Interchange infield intersection, including elimination of certain roadway boat sections, the Interchange will have greater open space characteristics. The NPC Design revises the plan to heavily landscape along the previous numerous Interchange roadways. Consistent with creating a gateway appearance, landscaping is planned around the outside of the viaducts, between the viaducts and the Memorial Stadium Park and between Ramp T-A/D and the realigned SR-10 (see Figure 4).

There will be a positive change in visual impacts in the Memorial Stadium Park area. Relocating Airport Station and eliminating the bus loop will open up over an acre of space on the west end of the park. MHD will continue to meet with the community to address the community's desire to maintain a visual corridor and create safe pedestrian connections through this open space area located between Porter Street and New Airport Station. Lower profiles of a number of roadways also will contribute to an overall visual improvement.

3.2 Transportation

3.2.1 Transit Ridership

The Central Transportation Planning Staff ("CTPS") performed an evaluation of the NPC

Design, as compared to the Base Design, to identify any impacts to either airport passenger, and, or community/regional transit ridership that could be expected to result from the NPC Design. The CTPS evaluation was performed in close coordination with Massport. Overall, the NPC Design, including relocating Airport Station, is not expected to change ridership projections noticeably.

Airport Passenger Transit Ridership. Impacts to airport passengers using public transit were evaluated using Massport's Logan Ground Access Model (the "LGAM"). The LGAM is an enhanced analytical tool that is used to project air passenger transit ridership for future years, and has been used to estimate ridership for Massport's proposed Airport Intermodal Transit Connector ("AITC") . The LGAM was developed using data from Massport's 1993 and 1996 Logan Air Passenger Surveys.

The LGAM predicts the modes of transportation that air passengers would use to travel to the airport. The model assumes that Massport's proposed AITC project is in place for both the Base and NPC designs. The AITC will connect the MBTA's Red Line from South Station to the airport terminals. The AITC also will connect the airport terminals to the MBTA's Blue Line at Airport Station. The NPC Design, with its airport service road changes, results in a 40 seconds savings in travel time between New Airport Station and the terminals, as compared to the Base Design's travel time between the existing Airport Station and the terminals.

As described above in Section 2.2, New Airport Station is expected to provide cross-platform transfers in the outbound direction. Those travelling in the inbound direction will cross over the train tracks to either exit at New Airport Station, or to access the inbound platform from the airport side of the tracks. Although elevators and escalators will be provided in the station design, a travel time penalty was used in the modeling for not providing a cross-platform transfer in the inbound direction. This adjustment to the modeling assumptions was made to ascertain whether a cross-platform transfer in only the outbound direction would be expected to change transit ridership as compared to the Base Design, which provided cross-platform transfers in both directions. No significant negative impact is identified by this change in design, as shown in Table 1 below.

Under the Base Design, Blue Line riders travelling to and from the airport terminals via shuttle bus would cross in front of the bus going to, and coming from, the station. The change from a cross-platform transfer proposed in 1991 (see Section 1.3 above), to crossing in front of the bus, is analyzed as part of Massport's AITC analysis (the proposed AITC project is identified in Massport's 1996 Annual Update to its Generic Environmental Impact Report, EOEA #3247/5146). Under the NPC Design presented in this document, passengers travelling on the shuttle bus no longer will cross in front of the bus. The NPC Design, therefore, provides a better, and safer, connection.

The total number of average weekday air passengers expected to use public transit to travel to the airport (from both the outbound and inbound directions) under the NPC Design, as compared to the Base Design, is provided in Table 1 below.

TABLE 1
Logan Ground Access Model
Ridership Projections, Year 2010

	Base Design	NPC Design
Average Weekday MBTA Ridership to Logan	4339	4390

While the results show a modest increase in ridership under the NPC Design, this increase is within the margin of error for the modeling. The NPC Design, thus, is expected to result in no significant change in air passenger ridership projections.

CTPS has not developed a Logan ground egress model to predict transit ridership for air passengers travelling from the airport. The Logan Ground Access Model is based on survey data collected from enplaning passengers (i.e. passengers arriving Logan Airport via the ground transportation network and departing by air). Logistically, this is the most reliable way to collect an adequate sample of survey responses since passengers typically have sufficient time to complete a questionnaire in the holding areas prior to boarding their flights. Attempts have been made to collect survey data for deplaning passengers (i.e. passengers flying into Logan Airport and departing via the ground transportation network) that could be used in the development of a Logan ground egress model. However, this methodology for data collection has proved unreliable and is plagued with low response rates and incomplete survey instruments. Therefore, the Logan Ground Access Model is used to project air passenger ground transportation mode choice for both the enplaning and deplaning air passenger (adjusted with available empirical data for the deplaning passenger). Based on the reasonable assumption that the Logan Ground Access Model can be used to predict both access and egress ridership, the NPC Design is not expected to significantly change overall air passenger transit ridership.

Massport has established the goal of increasing air passenger high occupancy vehicle ("HOV") mode share to 35.2 percent (of an estimated 37.5 million annual air passengers). Massport's AITC ridership analysis confirmed the use of 35.2 percent air passenger HOV mode share as a target. Of the 35.2 percent, the transit share is estimated to be 9.6 percent. The shuttle buses between the MBTA Airport Station and the airport terminals are operated by Massport free of charge to those utilizing this service and run on a very frequent schedule, as a means of encouraging transit use. The CTPS ridership analysis for this document shows that the NPC Design will not adversely affect Massport's transit goal.

Community/Regional Transit Ridership. Impacts to community and other regional users of the Blue Line were estimated using the CTPS Regional Travel Forecasting Model, which was calibrated based upon 1991 regional household and external travel surveys. This model forecasts travel (i.e. the number of trips, their origins and destinations, their mode, and their routes on the highway and transit systems) within the Boston Metropolitan area (north to New Hampshire, west to Westboro, MA, and south to South Attleboro, MA). The model caps at 15 minutes, the length

of time a person will wait at a transit station, and it caps at 0.5 mile and three miles per hour, the distance and the speed, respectively, that a person will walk between the station and his/her origin or destination point.

Using the Regional Travel Forecasting Model, CTPS predicted whether the average weekday boardings at Airport Station would be expected to change if the station is relocated and provides a cross-platform transfer only in the outbound direction. This analysis would indicate whether a change in community or regional use of the station would be expected based on these design changes. The results of the analysis are provided in Table 2 below.

TABLE 2
Regional Travel Forecasting Model
Ridership Projections, Year 2010

	Base Design Existing Airport Station	**NPC Design New Airport Station**
Average Weekday Boardings at Airport Station	5,900	5,880

The results of the analysis show that, on a regional level, there is a negligible difference in ridership (about 20 fewer boardings) between retaining Airport Station in its existing location, and relocating Airport Station. This difference is within the forecasting margin of error for the model. It, therefore, is concluded that relocating Airport Station has essentially no impact on expected regional transit ridership.

3.2.2 Traffic Operations

This section describes the potential change in vehicular traffic operational impacts in the Project's 2010 design year for the NPC Design, as compared to the Base Design. Conditions on the Project's mainline highway segments are not analyzed because there are no changes proposed to the mainline design, other than shifting Route I-90 northerly within the transportation corridor of the Base Design to allow for SR-14. Conditions on surface streets are identified by traffic volumes and operational characteristics, as described below. The intersections along SR-10, including the new intersection with Harborside Drive, are expected to operate under capacity with good progression of traffic flow through the intersections. The new SR-14 also is expected to operate under capacity. Generally, traffic operations on the airport service roads under the NPC Design are expected to be comparable to operations under the Base Design.

Assumptions and Methodology. The traffic forecasting modeling procedures used for the analysis are consistent with those described in the Project's 1991 FSEIS/R and 1996 South Bay/South Boston Areas Notice of Project Change/Environmental Reevaluation ("NPC/ER"). The model network for the Base Design includes roadways in the study area prior to any modifications resulting from the NPC Design. It is based on the design year 2010 network developed for the South Bay/South Boston Areas NPC/ER with the following Project additions

(the South Bay/South Boston Areas NPC/ER network includes the Project's 1993 I-90/Logan Airport Interchange NPC/ER):

- the surface street network described in the 1996 Central Area Surface Street Consensus Plan NPC/ER (joint MEPA filing by MHD and the City of Boston);
- the realigned SR-2 described in the 1997 Pan Am Cargo Building Demolition NPC/ER; and,
- the deletion of Ramp DD (I-90 westbound off-ramp to Marginal Road/Harrison Avenue) as described in the 1997 Revision to the South Bay/South Boston Areas NPC/ER.

In addition, the model network includes airport service roads and the Terminal Area Roadways described in Massport's West Garage Project 1995 FEIR/EAS and 1996 NPC.

Overall, the NPC Design is expected to affect a relatively small percentage of general airport traffic. The inclusion of SR-14 and the connection of SR-10 to Harborside Drive slightly change travel patterns for service road vehicles. Access between the airport North Service Area and Southwest Service Area/Bird Island Flats area is enhanced by SR-14, which effectively replaces the bus loop and SR-1. Airport shuttle buses will have a more direct route and will realize a modest reduction in trip time from the New Airport Station to the airport terminals under the NPC Design, as compared to the Base Design. Under the Base Design, the airport shuttle buses traveled from Airport Station on SR-2, to SR-1, to Ramp S-A, to access the airport terminals. Under the NPC Design, the travel route becomes more direct from New Airport Station on SR-14, to Ramp S-A, to the airport terminals. An evaluation was performed of the potential differences in overall vehicle miles traveled (VMT) between the Base and NPC designs. The results indicate a negligible decrease, approximately one percent, in VMT for the NPC Design roadway network in both the AM and PM peak hours, as compared to the Base Design roadway network.

Traffic operations at surface street intersections have been measured primarily using traffic levels of service (LOS) based on the *1994 Highway Capacity Manual* (HCM; also see the 1991 FSEIS/R Chapter 3, Transportation, and Transportation Appendix). LOS is a qualitative measure describing traffic operating conditions in terms of such factors as speed, travel time, and maneuverability. In general, LOS D or better is desirable. The analysis focused on peak commuter traffic times, which are 7 to 9 AM ("AM") and 4 to 6 PM ("PM").

Intersections within the NPC study area were evaluated for any change in operational impacts resulting from the NPC Design as compared to the Base Design. The evaluation was conducted using the following process:

- All signalized and unsignalized intersections were screened to determine if projected traffic volumes for the NPC Design would be higher than volumes projected for the Base Design. The screening criteria was a vehicle increase of 125

or more vehicles entering the intersection in either the AM or PM peak hour.

- New intersections resulting from the NPC Design (not existing in the Base Design) were identified and analyzed to determine the expected level of service.

- All intersections meeting the above criteria were analyzed using the detailed operations methodology presented in the HCM.

Results. The comparison of the Base and NPC design roadway networks showed that four intersections resulted in an increase of 125 or more vehicles entering the intersection during either the AM or PM peak hour under the NPC Design, as compared to the Base Design. These four intersections are (see Figure 3): SR-10/Enplaning-to-SR-10 (intersection number 1); SR-10/SR-11 (intersection number 2; Ramp T-S is added to this intersection under the NPC Design); SR-10/Hotel Drive (intersection number 3); and, SR-2/Bus Loop (intersection number 4; this intersection is reconfigured and is comprised of SR-2, SR-14, and Cottage Street under the NPC Design).

The NPC Design introduces three new intersections and eliminates two intersections that were in the Base Design (see Figure 3). The three new intersections are SR-10/Terminal A (intersection number 5), SR-10/Harborside Drive (intersection number 6), and SR-2/Frankfort Street/Prescott Street (intersection number 7). Under the Base Design, SR-10 ends at Terminal A, and vehicles travelling on SR-10 to Terminal A have a through traffic move. Under the NPC Design, because SR-10 is extended beyond Terminal A (to Harborside Drive), SR-10 at Terminal A now is an unsignalized intersection, and SR-10 at Harborside Drive is a new intersection. Similarly, under the Base Design, vehicles travelling on Prescott Street to Frankfort Street have a through traffic move. Extending SR-2 to Prescott/Frankfort streets results in a new unsignalized intersection where the three roadways now meet.

The two intersections that are eliminated by the NPC Design are SR-1 at SR-2 (intersection number 8), and Ramp T-S at Ramp 1A-S and SR-4 (intersection number 9, see Figure 2). The comparison of Base and NPC design intersections is provided below in Table 3.

TABLE 3
Comparison of Base and NPC Design Intersections
Year 2010

Location[1]	Base Design	NPC Design
1	SR-10/Enplaning-to-SR-10 Unsignalized Intersection	SR-10/Enplaning-to-SR-10 Signalized Intersection
2	SR-10/SR-11 Unsignalized Intersection	SR-10/SR-11/Ramp T-S (Ramp T-S added to intersection) Signalized Intersection

Location[1]	Base Design	NPC Design
3	SR-10/Hotel Drive Unsignalized Intersection	SR-10/Hotel Drive Signalized Intersection
4	SR-2/Bus Loop Unsignalized Intersection	SR-2/SR-14/Cottage Street Unsignalized Intersection
5	SR-10/Terminal A Through traffic move in Base Design	SR-10/Terminal A Unsignalized Intersection
6	Does not exist in Base Design	SR-10/Harborside Drive
7	Prescott Street to Frankfort Street Through traffic move in Base Design	SR-2/Frankfort Street/Prescott Street Unsignalized Intersection
8	SR-1/SR-2	Eliminated by the NPC Design
9	Ramp T-S/Ramp 1A-S/SR-4	Eliminated by the NPC Design

[1]See Figures 2 and 3 for intersection locations.

The four intersections showing an increase of 125 or more vehicles, and the three new NPC Design intersections, were analyzed to determine the expected intersection level of service. The results of the HCM intersection operations analysis for these seven intersections are shown in Table 4 below. Analysis of the two intersections eliminated by the NPC Design, SR-1/SR-2 and Ramp T-S/Ramp 1A-S/SR-4, is not included, since the intersections no longer exist under the NPC Design. The two eliminated intersections, therefore, are not included in Table 4.

TABLE 4
Levels of Service of Intersections
Year 2010

Location[1]	Intersection	Time Period	Base Design LOS	NPC Design LOS
1	SR-10/Enplaning-to-SR-10	AM PM	A/A[2] A/A	B B
2	SR-10/SR-11 (Base) SR-10/SR-11/Ramp T-S (NPC)	AM PM	A/A A/A	B B
3	SR-10/Hotel Drive	AM PM	A/A A/A	A A

Location[1]	Intersection	Time Period	Base Design LOS	NPC Design LOS
4	SR-2/Bus Loop (Base) SR-2/SR-14/Cottage (NPC)	AM PM	A/A A/A	A/C A/D
5	SR-10/Terminal A	AM PM	n/a n/a	A/A A/A
6	SR-10/Harborside Drive	AM PM	n/a n/a	B B
7	SR-2/Frankfort Street/Prescott Street	AM PM	n/a n/a	A/C A/D

[1] See Figures 2 and 3 for locations.
[2] Analysis results for unsignalized intersections are provided for the major/minor street approaches.

As shown in Table 4, overall intersection operations are acceptable under both the Base and NPC designs. The five intersections along SR-10 that were analyzed all are expected to operate well. The new SR-14 is expected to operate under capacity, with peak period volumes of approximately 550 vehicles in the AM peak hour, and 850 in the PM peak hour. Access between the airport's North Service Area and Southwest Service Area/Bird Island Flats area is enhanced by SR-14. Airport shuttle buses will have a more direct route from New Airport Station to the airport terminals. As stated in Section 2.1 above, the NPC Design's elimination of below-grade boat section roadways improves driver visibility and sight distances. Overall, the NPC Design improves the efficiency of the Logan Airport roadway system.

3.2.3 Pedestrian Circulation

In the Base Design, pedestrian access through the airport service areas is expected to remain similar to existing conditions. As indicated in the 1991 FSEIS/R, while most existing airport roads are at grade, pedestrian access across the airport is restricted (see 1991 FSEIS/R, Part I, Chapter 9, page 9-5).

The NPC Design presents opportunities to expand pedestrian access and circulation to, from, and within Logan Airport. In the I-90/Logan Airport Interchange area, with the extension of SR-10 to Harborside Drive, a new pedestrian connection will be provided along SR-10, linking Massport's central development parcel (the site for the replacement hotel) with Harborside Drive, which further connects to the Harborwalk and water shuttle dock (see Figure 4). A sidewalk along SR-10 also provides a connection between the airport's North Service and South Cargo areas.

In the Memorial Stadium Park area, a new pedestrian connection is planned between Porter Street

and New Airport Station, adjacent to the west end of the park. In addition, MHD, working with the MBTA, has identified a connection between Bremen/Brooks Streets and New Airport Station that will be incorporated during the final design process. This connection is a substantial improvement over the Bremen Street-Airport Station connection proposed as part of the Base Design, which would have required a number of changes in grade, creating a pedestrian environment that was unacceptable to the community.

Overall, the NPC Design improves pedestrian access to the airport from the water shuttle dock, is expected to substantially improve upon a pedestrian connection between Bremen Street and Airport Station, and provides better pedestrian connections to, from, and within Logan Airport.

3.3 Air Quality

This section reports the results of an analysis of the potential air quality impacts of the NPC Design using updated traffic projections. Results indicate that the NPC Design will comply with applicable National and State Ambient Air Quality Standards (AAQS). Accordingly, there will be no change from the Base Design with regard to meeting applicable standards. This section provides a summary of the analysis. Detailed results are available in a separate Technical Support Document for Air Quality Analysis of East Boston Area NPC/ER (December, 1997).

Assumptions and Methodology. The assumptions and methodologies used in the assessment of the air quality impacts for this document follow the air quality protocol prepared for the 1994 Charles River Crossing FSEIS/R (the "1994 FSEIS/R"), and the most recent motor vehicle emissions updates recommended by the Massachusetts Department of Environmental Protection (the "DEP"). The methodology employed for the carbon monoxide ("CO") analysis used the most recent United States Environmental Protection Agency ("EPA") modeling criteria; *EPA Guideline for Modeling Carbon Monoxide at Intersections* (EPA-454/R-92-005), and the most recent version of the *EPA Emission Factor Model Mobile 5a* (EPA-AA-TEB-92). Several inputs to the Mobile 5a Model regarding future Federal and State motor vehicle controls (i.e. Enhanced Inspection and Maintenance Programs) have been updated by DEP in May 1995 (*DEP 1995 Letter Stating the Mobile 5a Inputs in the Massachusetts Vehicle Registration Data*). All other input parameters related to localized CA/T Project traffic characteristics and fleet composition remain the same as the ones presented in the 1994 FSEIS/R, and as agreed upon in the 1993 Protocol for Air Quality Analysis, approved by DEP and EPA. Overall, the version of the Emission Factor Model used for this analysis incorporates the most recent Federal and Massachusetts emissions control requirements expected to be in place for the year 2010.

Results. The results of the 1991 FSEIS/R analysis indicate that, in general, the Project will result in a net reduction in overall vehicular emissions and will improve the air quality levels in most of the critical intersections investigated. Furthermore, the results also indicate that the Project would not cause or exacerbate a violation of any National or Massachusetts AAQS. Traffic volumes, speeds and roadway configurations affect both the amount of emissions generated and how it is dispersed in the atmosphere; as a consequence, this assessment includes a localized CO impact analysis at the intersections most likely affected by the NPC Design.

In terms of regional emission levels, the relatively minor design changes concerning the I-90/Logan Airport Interchange infield intersection, airport service roads, and the bus loop, will not significantly affect travel patterns beyond the immediate area, and as a consequence, no changes to the overall regional emission levels are expected. By comparison, the more significant design changes reported for the Project's 1994 Charles River Crossing FSEIS/R, and the South Bay/South Boston Areas NPC/ER (March, 1996) resulted in statistically insignificant regional changes for CO, volatile organic compounds, nitrogen oxides and particulate matter. As a result, a regional emissions analysis is not warranted.

In terms of emissions from the ventilation buildings, the NPC Design changes will not affect the operation of ventilation building 7, which location is more than 2,000 feet away from the closest intersection analyzed. As a result, the ventilation building analysis performed for the 1991 FSEIS/R remains valid.

To assess how the NPC Design is likely to affect localized CO levels, a screening analysis was performed to select those intersections with the greatest potential to have the highest CO levels and the greatest increase in levels over those predicted for the Base Design. Traffic volumes associated with the NPC Design were compared to the Base Design volumes. Selection of intersections for study was based on the following criteria: 1) a total intersection volume of 1,800 vehicles per hour or more; and, 2) an increase in combined approach volume of 10 percent or more over the Base Design. None of the intersections in the study area meet these criteria. Although none of the intersections meet the criteria, two intersections were selected for a CO modeling analysis. The first, Harborside Drive at Jeffries Street, was selected due to its proximity to the East Boston community, even though its traffic increase over the Base Design is expected to be minimal. The second, SR-10 at SR-11 and at Ramp T-S, was selected due to its traffic increase of over 10 percent as compared to the Base Design, and its proximity to the planned replacement hotel.

The results of the CO microscale analysis are summarized in Table 5 below, showing the predicted 1-hour and 8-hour maximum CO levels for the year 2010 under both the Base and NPC designs at each of the two identified intersections.

TABLE 5
Predicted Worse Case 1 Hour and 8 Hour Carbon Monoxide Levels (ppm)
Year 2010

Location	**Base Design**		**NPC Design**	
	1 Hour	**8 Hour**	**1 Hour**	**8 Hour**
Harborside Drive at Jeffries Street	6.2	4.2	7.1	4.9
SR-10 at SR-11 and at Ramp T-S	4.1	2.6	4.9	3.2

1 Hour levels include a background level of 3.0 parts per million (ppm)
8 Hour levels include a background level of 1.8 ppm
Reported levels are the highest of the AM or PM periods

The results indicate that based on revised traffic volumes associated with the NPC Design, both intersections will be in compliance with the 1-hour and 8-hour AAQS of 35 parts per million (ppm) and 9 ppm, respectively. As the remaining intersections have comparable or lower traffic volumes than the two intersections analyzed, it is expected that the remaining intersections will result in comparable, or lower, predicted CO levels.

3.4 Noise and Vibration

3.4.1 Noise

This section reports the results of an evaluation of the potential traffic noise impacts of the NPC Design, as compared to the impacts of the Base Design. Updated traffic projections were used in the evaluation. Results indicate that the NPC Design will reduce the noise impact to Memorial Stadium Park. No noise impact to the planned airport hotel is expected to result from the NPC Design.

The Project's 1991 FSEIS/R evaluates 13 locations in the East Boston area for potential noise impacts. These locations include land uses potentially sensitive to noise, such as residences, churches, schools, or parklands. Of the 13 locations, the closest ones to the proposed design changes described in this document are site numbers 10 and 30, identified in the 1991 FSEIS/R as:

10 East Boston recreation area at home plate of west baseball field; and,
30 East Boston Memorial Stadium Park on tennis courts about 100 feet north of Egress Road.

No significant changes would be expected at the Bremen Street sites identified in the 1991 FSEIS/R because traffic noise from Bremen Street itself and from Route 1A would dominate over noise levels associated with the relocated Airport Station. The two Memorial Stadium Park locations (10 and 30) are in nearby proximity to the proposed changes to Airport Station and the bus loop. Consequently, this document addresses any expected change in future noise levels at these two locations based on the NPC Design, as compared to the Base Design.

The NPC Design's extension of SR-2 to Frankfort/Prescott streets will locate this roadway in close proximity to the Delta Reservations Building (approximately 2 to 4 feet from the building's west side at the roadway's closest point). This building was not identified in the 1991 FSEIS/R and is not considered to be a noise-sensitive land use. It is owned by Massport and leased to Delta Reservations. The building is on airport property, and therefore, already is located in an area where noise levels are dominated by aircraft overflights and airport ground activities. In addition, the existing Blue Line tracks are only about 8 ½ feet from the building's west side, contributing to existing noise levels at the building. While the proximity of the SR-2 extension

would be expected to contribute to the noise levels at the Delta Reservations Building, it would not be expected to result in a substantial increase in noise levels (defined as a 10 dBA increase in noise levels by the Massachusetts Highway Department Type I Noise Abatement Guideline, March 19, 1996), as compared to the Base Design.

None of the 13 locations identified in the 1991 FSEIS/R are in close proximity to the I-90/Logan Airport Interchange. A new hotel has been permitted and will be sited on Massport's central development parcel, which is located near the Interchange. Future noise levels at the central development parcel, therefore, were evaluated.

Assumptions and Methodology. For noise evaluation assumptions and methodology, see the 1991 FSEIS/R Chapter 5 and Noise and Vibration Appendix. The basic unit describing existing and future noise levels is the A-weighted decibel (dBA). As explained in the 1991 FSEIS/R, since noise fluctuates from moment to moment, it is common practice to average time-varying noise levels over a specified period of time into a single number called the equivalent noise level (Leq). Many surveys show that the descriptor Leq (1 hour), measured in dBA, correlates well with subjective human response to noise, and properly predicts annoyance due to changes in noise levels. Future noise predictions for this NPC evaluation were made in accordance with the Federal Highway Administration's (the "FHWA") abbreviated Traffic Noise Prediction Model entitled "NOISE.EXE".

FHWA criteria require that noise abatement be considered if project-generated noise approaches or exceeds the noise abatement criteria (NAC), or if the project will substantially increase noise levels at sensitive locations (FHWA Traffic Noise Abatement Criteria, 23 CFR Part 772). A substantial increase in noise levels for highway projects in Massachusetts is defined as a 10 dBA increase over the base noise levels (Massachusetts Highway Department Type I Noise Abatement Guideline, March 19, 1996).

Results. *1991 FSEIS/R Locations 10 and 30; Memorial Stadium Park.* The 1991 FSEIS/R predicted a 1 to 6 dBA higher noise level with the Project constructed than the applicable noise abatement criterion level at locations 10 and 30, both located at East Boston Memorial Stadium Park (see 1991 FSEIS/R, Part I, Chapter 5, Table 5.6). The 1991 results are listed below in Table 6 in the Base Design column.

Relocating Airport Station and replacing the bus loop with the SR-2 to SR-14 connection will move transit and bus operations out of the west end of Memorial Stadium Park. While SR-14 will be located adjacent to the north side of the Park, Route I-90 will be shifted northerly so that SR-14 is within the existing transportation corridor. The approved Project roadways along the north side of the park include a ramp that will provide the main access to Logan Airport for those travelling from Route 1A, I-90 westbound, and I-90 eastbound. These roadways will have much greater traffic volumes than SR-14, an airport surface road to be used by airport shuttle buses, and vehicles travelling between the north and south cargo areas of the airport. Shifting Route I-90 away from the Park, thus will shift the majority of traffic away from the Park.

Based on the traffic analysis data, noise levels were screened to identify a potential change in

impact between the Base and NPC designs for the AM and PM peak hour traffic conditions for the year 2010. Expected bus and truck use of SR-14 was factored into the noise evaluation. Based on the relative changes in roadway locations and volumes, Table 6 below summarizes the results of the evaluation.

TABLE 6
Predicted Traffic Noise Levels at Memorial Stadium Park
(Noise levels for peak traffic hour Leq in dBA)

Site No.	Base Design 2010		NPC Design 2010		Change	
	AM	PM	AM	PM	AM	PM
10 Homeplate of west baseball field	67	68	66	66	-1	-2
30 Tennis courts	73	73	69	70	-4	-3

As shown in Table 6, traffic noise levels are anticipated to be lower at the two locations at Memorial Stadium Park under the NPC Design, as compared to the approved Base Design. There is an imperceptible change (a reduction of 1 to 2 dBA) at Site 10 when future NPC Design noise level predictions are compared to Base Design predictions. Site 30, however, will benefit from the proposed design changes, since predicted noise levels are expected to decrease about 3 to 4 dBA. The noise levels predicted under the NPC Design for Site 30 still exceed the Federal Highway noise impact criteria (NAC) of 67 dBA Leq (hr) for a Category B (outdoor noise) land use receptor, as they did under the Base Design. Consequently, the consideration of noise mitigation is warranted.

Proposed Noise Barriers at Memorial Stadium Park. In response to the predicted noise levels at Memorial Stadium Park, the 1991 FSEIS/R recommended the following noise barriers: 1) a 20 feet high, 1,400 feet long barrier on the northern boundary; 2) a 16 feet high, 450 feet long barrier on the eastern boundary; 3) a 16 feet high, 700 feet long barrier on the western boundary; and, 4) an 8 feet long structural barrier on the 1AS-AD viaduct. The 1991 FSEIS/R indicated that a final design decision regarding the barriers would be made subject to community review.

Since 1991, through coordination with the community and the property owner, the Boston Parks and Recreation Department (the "BPRD") Project staff have been informed that the barriers are not desired. In a letter dated December 2, 1996, the BPRD Commissioner wrote to the CA/T Project Director "[w]e appreciate the conception that this wall will mitigate some negative noise impacts created by the increased capacity of the adjacent highway system; nevertheless, the City of Boston Parks and Recreation Department (BPRD) feels that constructing a barrier adjacent to three sides of the stadium will invite serious safety problems for the park users. We cannot, therefore, support the construction of this barrier. . . . As you know, the community has indicated

in the Project's recent East Boston Community Park Design Workshops that they are against the construction of the proposed noise barrier for many of the same reasons listed above." Through the preliminary design process, it also has been determined that the 8 feet long structural barrier proposed in the 1991 FSEIS/R to be located on the 1AS-AD viaduct also is not desirable.

While predicted noise levels under the NPC Design still exceed the FHWA NAC, noise barriers at Memorial Stadium Park are no longer recommended because they are not desired by the property owner, nor by the community. In addition, Memorial Stadium Park is not a parkland that necessarily requires quiet and serenity for its intended use and enjoyment. It is a heavily-used recreational area that is itself noisy. Moreover, the NPC Design mitigates the noise impacts of the approved Base Design by moving transit and bus operations out of the west end of the park, and moving highway traffic further away from the north side of the park, resulting in lower predicted noise levels at the park.

Central Development Parcel. Massport's central development parcel was not evaluated as a sensitive noise receptor in the 1991 FSEIS/R. Since 1991, a new hotel has been permitted and will be sited on the parcel. Future noise levels, therefore, were evaluated. For screening purposes, future noise levels were predicted at the side of the planned hotel nearest to the design changes (the western facade) based on the building footprint shown in the Logan Hilton Joint Venture Notice of Project Change (EOEA #10746, April, 1997).

Based on the updated traffic data, noise levels were screened to identify a potential change in impact between the Base and NPC designs for AM and PM peak hour traffic conditions for the year 2010. Noise contributions were predicted from roadways surrounding and nearby the central development parcel. These roadways are: I-90 eastbound, I-90 westbound, highway ramps, airport access and egress roadways, SR-10, and SR-11.

The following table summarizes the predicted traffic noise level results.

TABLE 7
Predicted Traffic Noise Levels at Central Development Parcel
(Noise levels for peak traffic hour Leq in dBA)

	Base Design 2010		**NPC Design 2010**		**Change**	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**
Central Development Parcel	66	66	66	66	0	0

As shown in Table 7, the overall noise levels at the central development parcel are not expected to change based on the NPC Design, as compared to the Base Design. The noise levels predicted for the central development parcel do not exceed the applicable NAC of 67 dBA. In addition, the NPC Design does not result in a substantial increase in noise levels. Moreover, SR-10 is not a predominant noise source. The noise levels at the central development parcel would be expected

to be dominated by noise generated by motor vehicles on the many roadways surrounding the parcel, particularly I-90 eastbound and I-90 westbound, and by aircraft operations at the airport. The proposed land use is locating on the parcel with knowledge of planned CA/T Project and Massport construction and future roadways. These conditions have been appropriately accounted for by the developer in designing the proposed project. For example, the developer has designed the air space between layers of glass to be 2 inches, and will employ acoustical insulation within the building's shell.

3.4.2 Vibration

Overall, the NPC Design is expected to affect a relatively small percentage of general airport traffic. Traffic operations at intersections generally will be comparable to operations under the Base Design. Vibration levels caused by road traffic under the NPC Design, therefore, are expected to be comparable to vibration levels caused by traffic under the Base Design. As stated in the 1991 FSEIS/R, no adverse, long-term, vibration effects are anticipated from the Project.

The extension of SR-2 to the Prescott/Frankfort streets intersection will be aligned between the Blue Line tracks and the Delta Reservations Building. Currently, the Blue Line tracks are located approximately 8 ½ feet from the west side of the building. These tracks will be relocated in a westerly direction to allow for the SR-2 extension, which at its closest point will be located at a distance of 2 to 4 feet from the west side of the building. The relatively low volumes of traffic expected to use SR-2 (between 100 and 500 vehicles in the peak traffic hours) at relatively low speeds of approximately 30 miles per hour are not expected to result in any new adverse vibration impacts to the Delta Reservations Building.

3.5 Other Resources

Based on Project information, the area of design changes is located outside of both Federal and State wetland resource areas. No impact to wetland or water resources is anticipated. Wildlife in the area is very limited due to airport operations, vehicular traffic, and the developed nature of the site. The NPC Design will have no effect on the density or abundance of the already limited wildlife and, or, vegetation. No known threatened species of plants or animals exist within the area. The NPC Design is not expected to impact any historical or archaeological resource, and will reduce impacts to East Boston Memorial Stadium Park, as compared to the Base Design.

3.6 Construction and Demolition

Elimination of the SR-1 tunnel and boat section, and other boat sections located within the I-90/Logan Airport Interchange infield intersection, will substantially reduce construction impacts.

Even with the additional construction required for the widening and extension of SR-10, the NPC Design in this area would be expected to reduce construction impacts because the boat roadway sections would have required complex construction. Eliminating these sections reduces the amount of excavation, resulting in a corresponding reduction in the materials to be handled, tested and disposed of. Not constructing the boat sections also substantially reduces the requirements

for concrete. Reduced materials disposal and concrete needs in turn reduces construction truck traffic. Reconstructing Airport Station in place, or reconstructing the station in a shifted location would be expected to have substantially similar construction impacts. Similarly, replacing the at-grade bus loop with the at-grade SR-14 is considered to be equivalent in terms of construction impacts.

No substantial changes are expected in construction-period traffic, air quality, or noise impacts based on the NPC Design, as compared to the Base Design. The Project's construction-period maintenance of traffic process, construction-period air quality committee process, and construction-period noise control program are in place and will cover the NPC Design Project contracts. Overall, the simplified construction plan represented by the NPC Design could result in a shortening of some Project scheduled work.

All materials removed in connection with the demolition of the existing Airport Station will be handled in accordance with applicable regulatory requirements. Appropriate measures will be taken, if needed, to minimize temporary drainage and, or, dust impacts of the cleared site. Final uses and landscaping of the site will be determined during the final design process with input from the East Boston community, the Boston Parks and Recreation Department, Massport, the MBTA, and other interested parties.

3.7 Utilities and Drainage

Deleting SR-1 eliminates the need to relocate certain major utilities. In addition, the elimination of the below-grade boat sections reduces the amount of stormwater flow that will go to an existing CA/T Project stormwater pump station located near the toll facilities. Any needed changes to utility connections, or new connections, resulting from the NPC Design, including demolishing the existing Airport Station and constructing New Airport Station, will be coordinated among MHD, the MBTA, Massport, and the utility companies, as needed.

4 PERMITS

No additional Federal, State, or local permits for the CA/T Project are expected as a result of the NPC Design. Modifications to existing CA/T Project permits may be required during the final design process. During the final design process for New Airport Station, the MBTA will be responsible for obtaining any necessary approvals and, or, permits, that may be required for constructing the station.

5 CONCLUSION

A review of the Massachusetts Environmental Policy Act (MEPA) regulations at 301 CMR 11.17 (a) through (i) follows:

(a) the NPC Design does not result in an increase of the project size or frequency of activity; the design changes are located within the existing CA/T and Massport project limits;
(b) the NPC Design is not expected to generate further impacts to traffic, noise, air quality, or other resources, and it is expected to reduce impacts to the East Boston Memorial Stadium Park;
(c) the NPC Design is not expected to increase the emission of pollutants during or after completion;
(d) the NPC Design will not change the Project's expected commencement or completion date; the NPC Design could result in a shortening of some Project scheduled work;
(e) the NPC Design does not change the CA/T and Massport projects sites; the NPC Design does relocate Airport Station and the 1991 Design bus loop to shift transit and bus operations away from Memorial Stadium Park and the East Boston community;
(f) the NPC Design is not expected to require additional Federal, State, or local permits for the CA/T Project; New Airport Station may require additional permits, which will be acquired by the MBTA;
(g) the NPC Design does not prevent attainment of CA/T or Massport improvements to environmental quality;
(h) this NPC is being filed after the filing of a Final EIR; and,
(i) the Project has substantially commenced.

A review of the factors set forth at 301 CMR 11.17 (a)-(i), and the results of the analyses described in this document, indicate positive environmental consequences of the NPC Design, as compared to the Base Design. MHD believes, therefore, that no further environmental review under 301 CMR 11.17 is required.

Boston

Thomas M. Menino, Mayor

Mr. Peter M. Zuk
Project Director
Central Artery/Tunnel Project
One South Station
Boston, MA 02110

2 December 1996

Mr. Zuk:

I am writing to you regarding the noise barrier wall proposed for location around East Boston Memorial Stadium. We appreciate the conception that this wall will mitigate some negative noise impacts created by the increased capacity of the adjacent highway system; nevertheless, the City of Boston Parks and Recreation Department (BPRD) feels that constructing a barrier adjacent to three sides of the stadium will invite serious safety problems for the park users. We cannot, therefore, support the construction of this barrier.

The BPRD is very concerned about constructing the noise barrier wall for several reasons. The barrier proposes to enclose three quarters of the park, hindering visual access into or out of the park. Considering the nature of the park's location, it is important both physically and visually to maintain ingress and egress for the safety of the park's users. We are also concerned about the maintenance of the wall. Again, considering the urban context of the park, we feel that this wall will become a prime target for vandalism and would potentially create an environment conducive to illicit activities. Finally, in light of the fact that the stadium is currently surrounded by highway and is heavily impacted by Logan Airport, we feel that this noise barrier may not be an effective measure in mitigating the expanded highway. We feel the Project would better serve the community by re-allocating the barrier wall budget to other East Boston mitigation efforts.

As you know, the community has indicated in the Project's recent East Boston Community Park Design Workshops that they are against the construction of the proposed noise barrier for many of the same reasons listed above. They have, although, responded favorably to proposed perimeter plantings as an alternative. The BPRD supports the East Boston community in this preference.

In conclusion, it is our hope that the Project will not construct the proposed noise barrier wall in response to our concerns as well as the wishes of the East Boston Community. If you should have any questions regarding this matter, please contact Jill Ochs Zick at 635-4505 x 6517.

Thank you for your attention and consideration of this matter.

Respectfully,

Justine Liff

Justine M. Liff, Commissioner

cc: Jim Gillooly, Boston Transportation Department, CA/T Cooridination Team
Lorraine M. Downey, Boston Environment Department

Justine M. Liff/Commissioner/Parks and Recreation Department/1010 Mass. Ave./Boston, MA 02118

TOTAL P.02

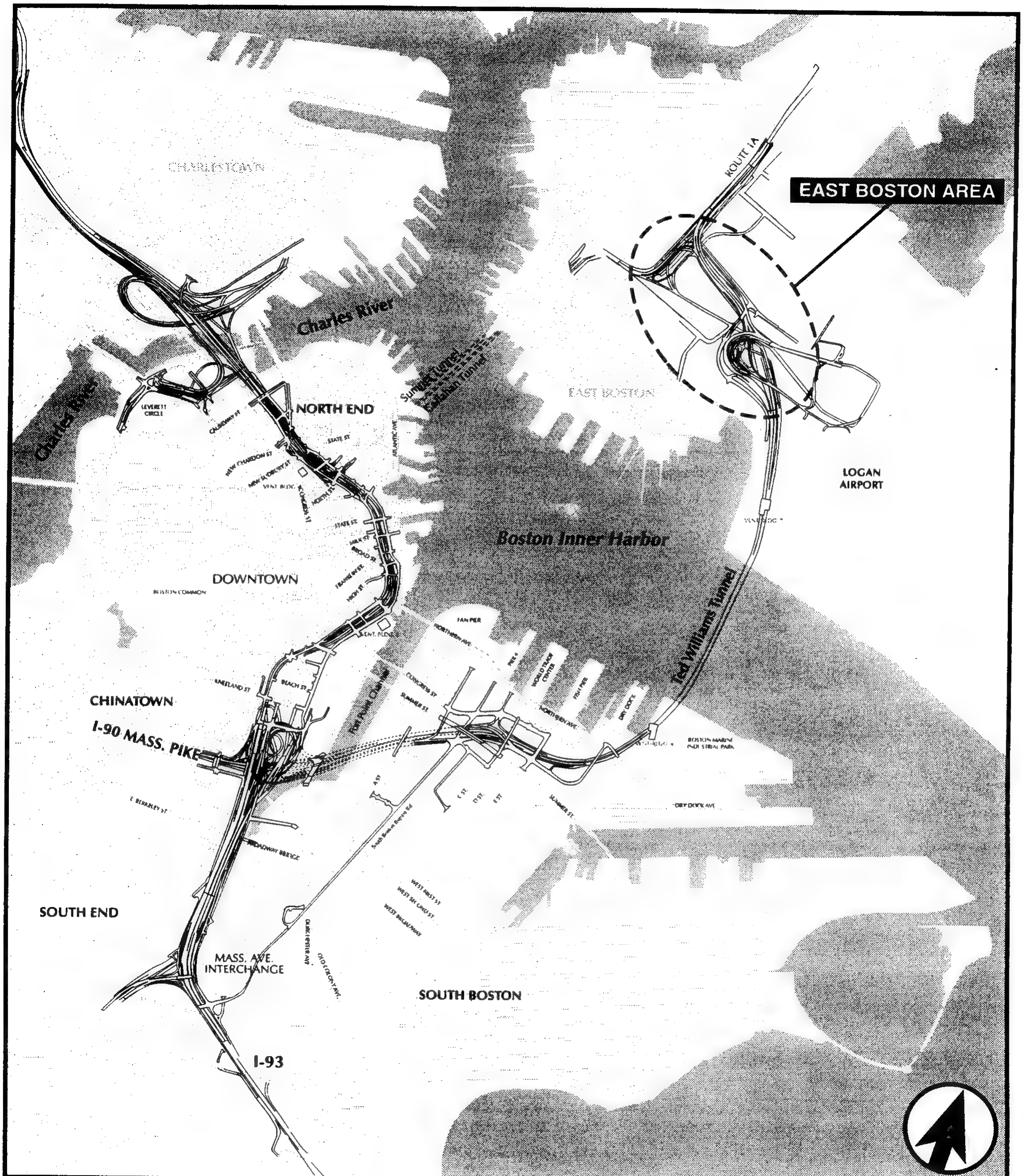


FIGURE 1

EAST BOSTON AREA

MASSACHUSETTS HIGHWAY DEPARTMENT
CENTRAL ARTERY/TUNNEL PROJECT

DECEMBER 1997

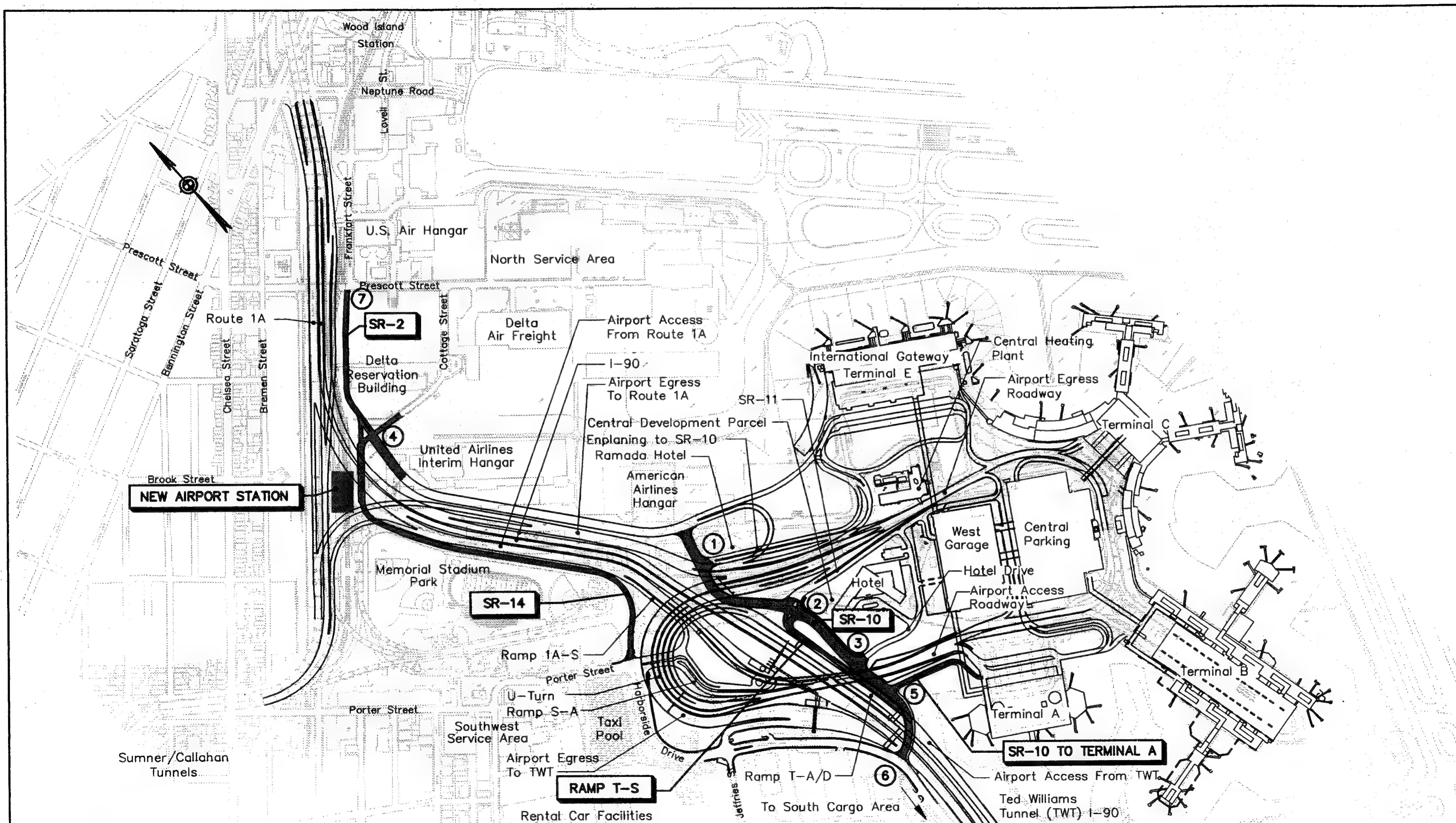


Figure 3

Legend

Modified in NPC

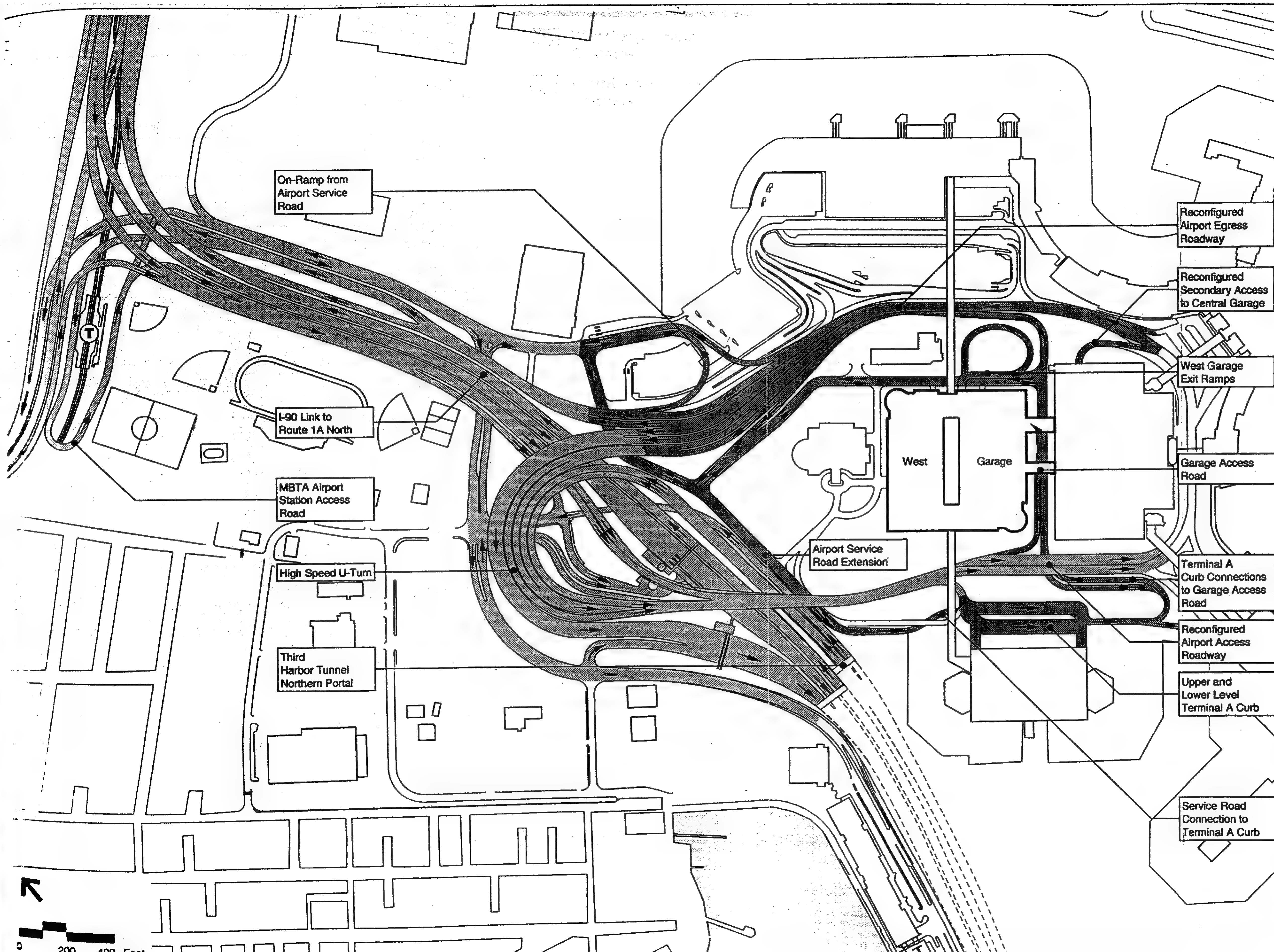
(X) Intersection Number

NPC Design

Scale 1" = 500'

Massachusetts Highway Department
Central Artery/Tunnel Project

DECEMBER 1997



West Garage Project Roadways

Central Artery / Tunnel Roadways

Source: Vollmer Associates
Gillham and Gander Associates, Inc.

Figure III-15

West Garage Roadways and Conceptual On-Airport Roadway Network: 1999

4211-WGC

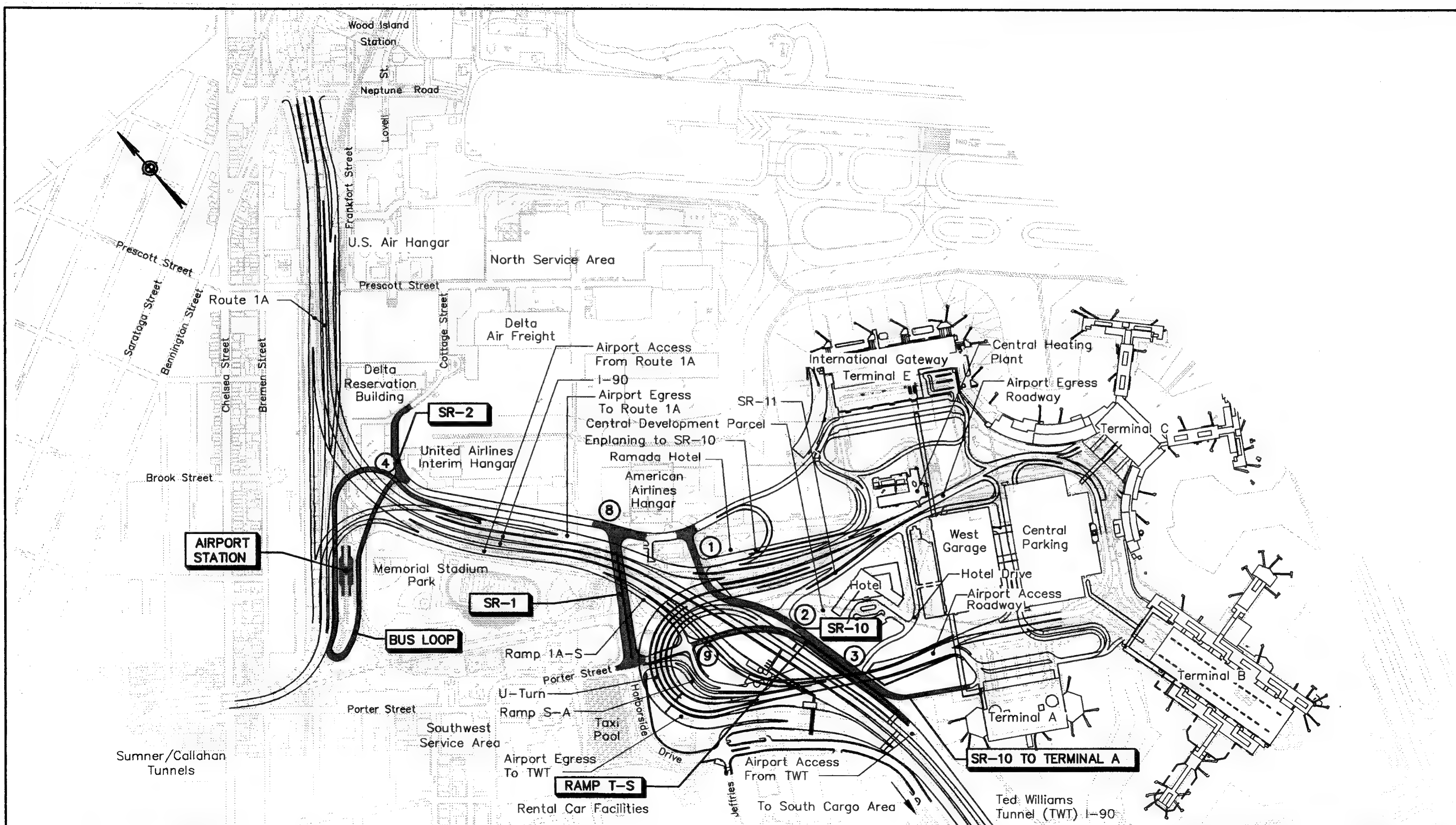


Figure 2

Legend

Modified in NPC

(X) Intersection Number

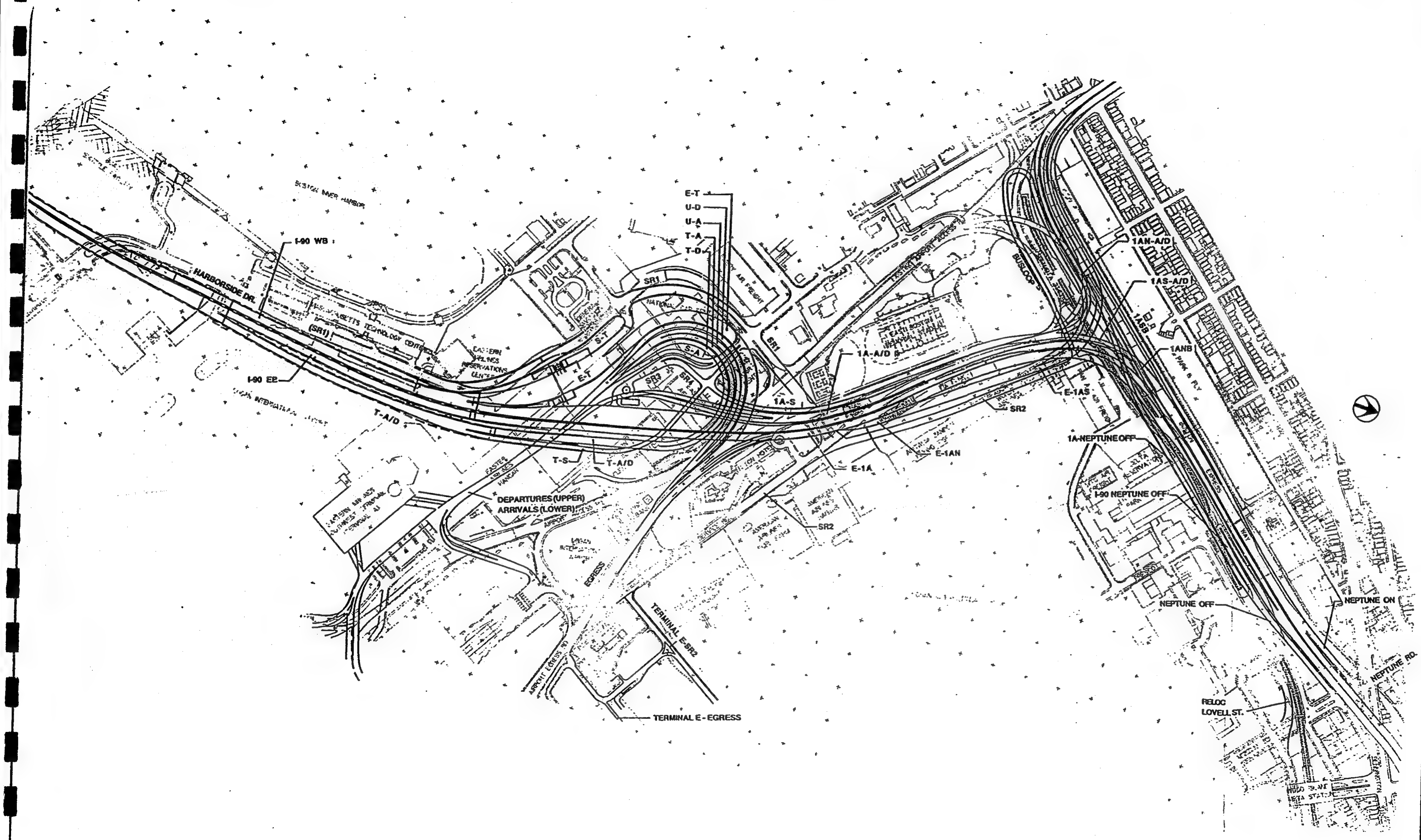
Base Design

Scale 1" = 500'

Massachusetts Highway Department
Central Artery/Tunnel Project

DECEMBER 1997

1720100\K:\STUDY\8ANPC\FIG2.DWG



MASSACHUSETTS HIGHWAY DEPARTMENT
CENTRAL ARTERY (I-93)/TUNNEL (I-90) PROJECT

Proposed Design Refinements
(Scheme CLV-5C)

FIGURE 3

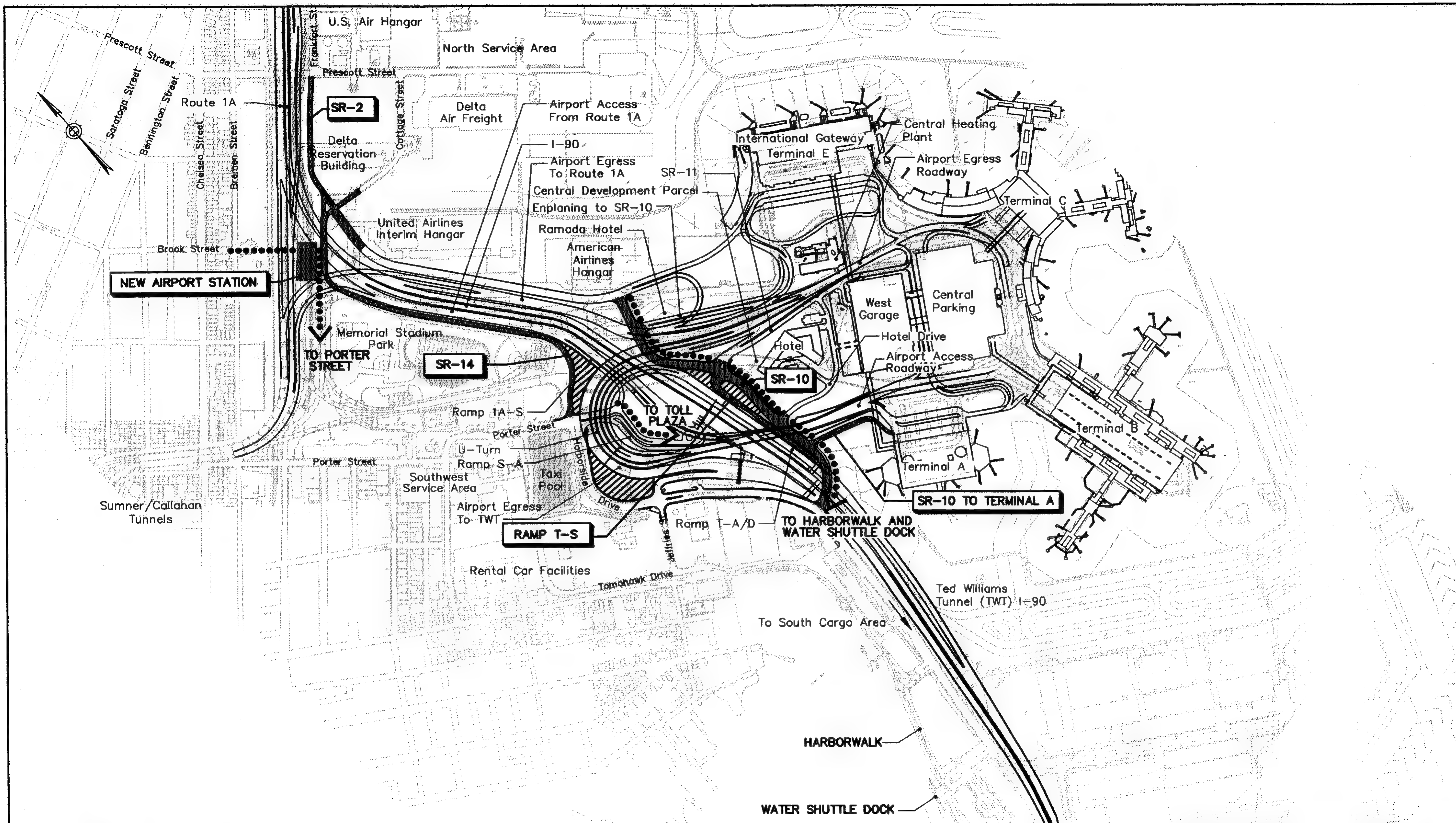


Figure 4

Legend
- Modified in NPC
- Proposed NPC Pedestrian Connections
- Landscaped Parcels

NPC Design
Pedestrian Connections and Landscaping

Scale 1" = 600'

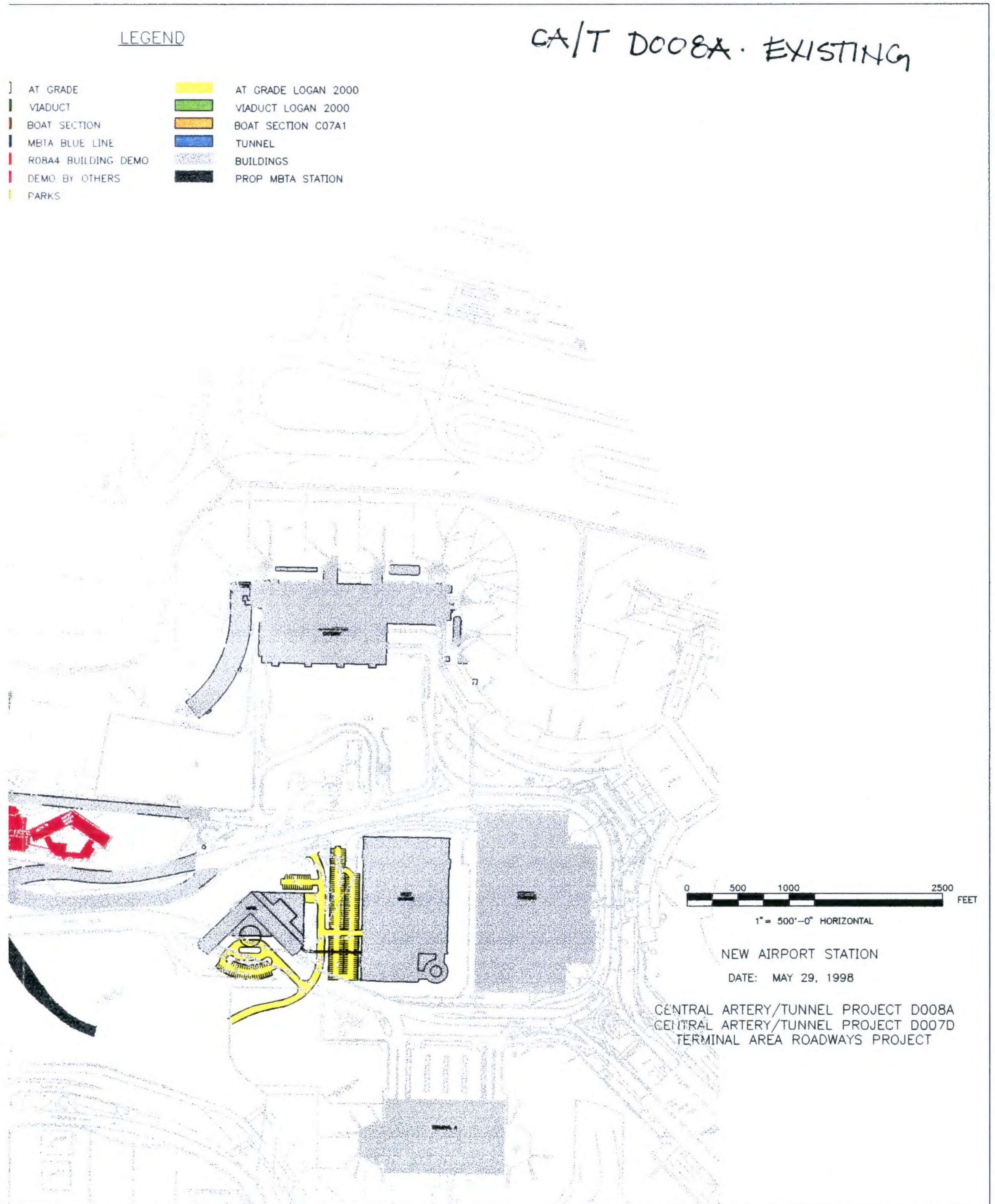
Massachusetts Highway Department
Central Artery/Tunnel Project

DECEMBER 1997

972010\K:\STUDY\BANPC\FIG5.DWG

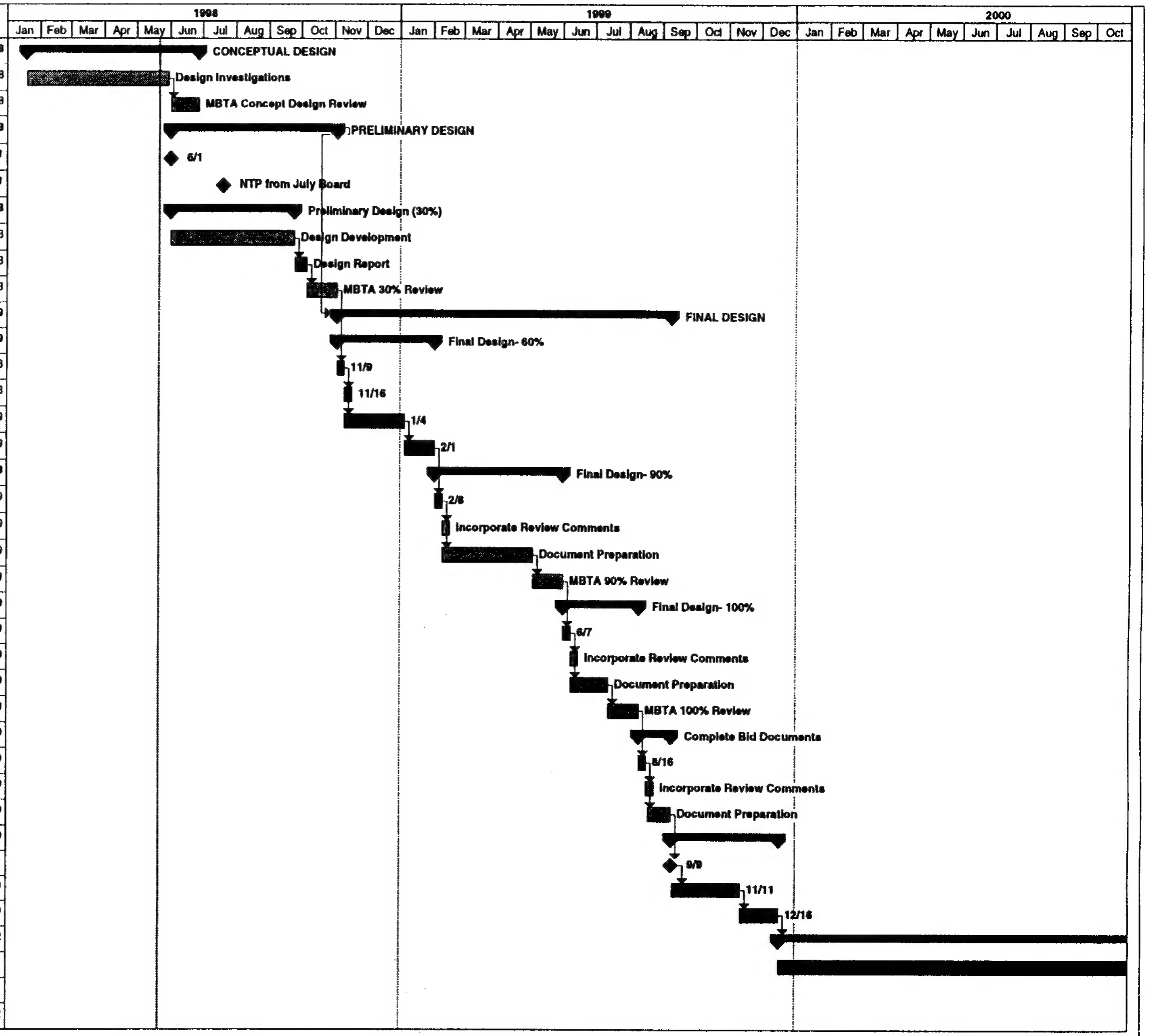
Appendix G. CA/T D008A Drawings - Existing and Proposed

Appendix G. CA/T D008A Drawings - Existing and Proposed



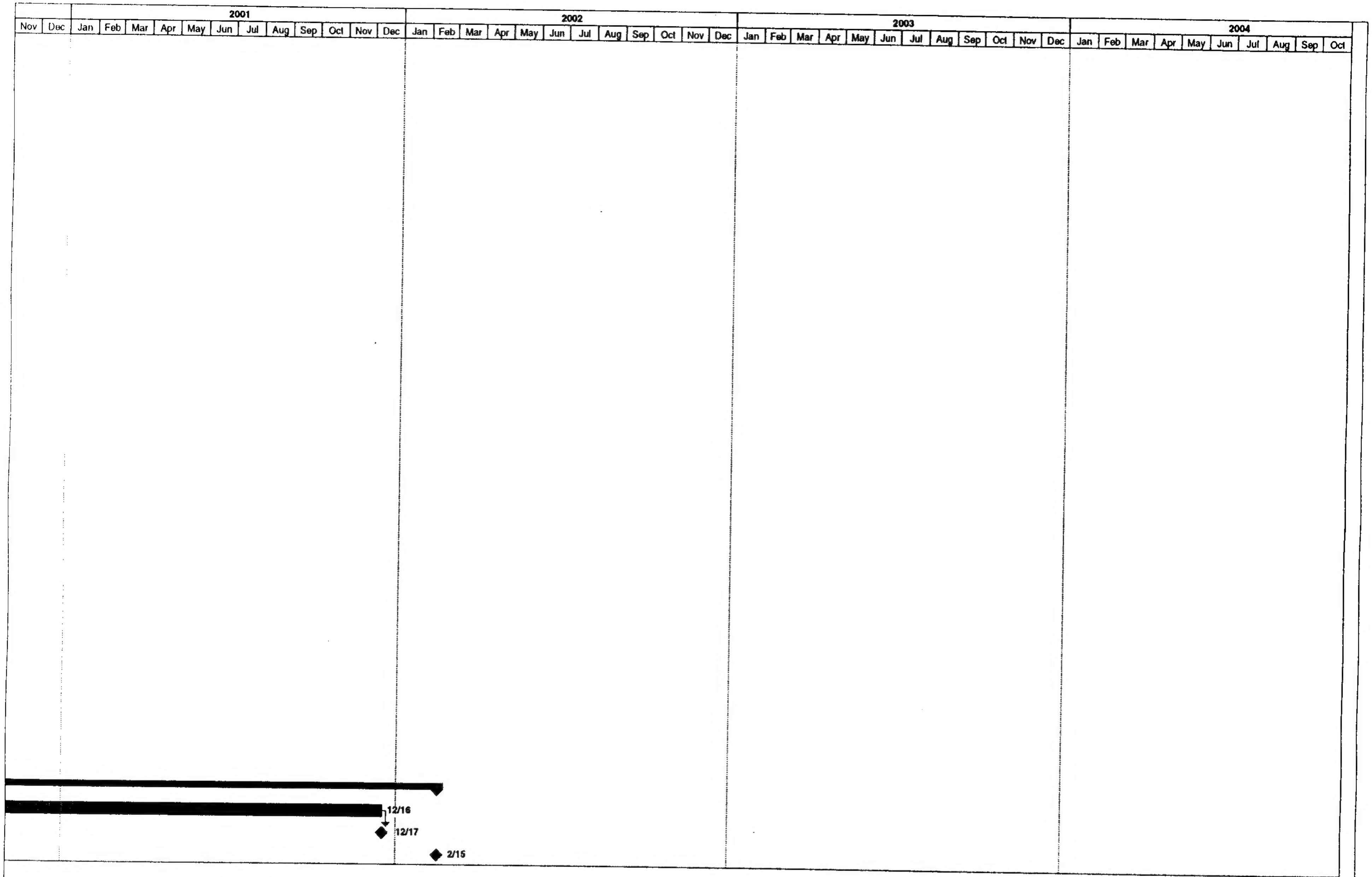
Appendix H. Airport Station Project Schedule

ID	Task Name	Duration	Start	Finish
1	CONCEPTUAL DESIGN	115d	1/19/98	6/26/98
2	Design Investigations	95d	1/19/98	5/29/98
3	MBTA Concept Design Review	4w	6/1/98	6/26/98
4	PRELIMINARY DESIGN	111d	6/1/98	11/2/98
5	*Partial NTP*	*0d*	*6/1/98*	*6/1/98*
6	*NTP from July Board*	*0d*	*7/20/98*	*7/20/98*
7	**Preliminary Design (30%)**	**83d**	**6/1/98**	**9/23/98**
8	Design Development	16.6w	6/1/98	9/23/98
9	Design Report	1.5w	9/24/98	10/5/98
10	MBTA 30% Review	4w	10/6/98	11/2/98
11	FINAL DESIGN	222d	11/3/98	9/8/99
12	**Final Design- 60%**	**65d**	**11/3/98**	**2/1/99**
13	Review Comment Consolidation	1w	11/3/98	11/9/98
14	Incorporate Review Comments	1w	11/10/98	11/16/98
15	Document Preparation	8w	11/10/98	1/4/99
16	MBTA 60% Review	4w	1/5/99	2/1/99
17	**Final Design- 90%**	**85d**	**2/2/99**	**5/31/99**
18	Review Comment Consolidation	1w	2/2/99	2/8/99
19	Incorporate Review Comments	1w	2/9/99	2/15/99
20	Document Preparation	12w	2/9/99	5/3/99
21	MBTA 90% Review	4w	5/4/99	5/31/99
22	**Final Design- 100%**	**50d**	**6/1/99**	**8/9/99**
23	Review Comment Consolidation	1w	6/1/99	6/7/99
24	Incorporate Review Comments	1w	6/8/99	6/14/99
25	Document Preparation	5w	6/8/99	7/12/99
26	MBTA 100% Review	4w	7/13/99	8/9/99
27	**Complete Bid Documents**	**22d**	**8/10/99**	**9/8/99**
28	Review Comments Consolidation	1w	8/10/99	8/16/99
29	Incorporate Review Comments	1w	8/17/99	8/23/99
30	Document Preparation	3w	8/19/99	9/8/99
31	BID/AWARD	71d	9/9/99	12/16/99
32	*PS & E Complete/Advertise/ELKBD*	*0d*	*9/9/99*	*9/9/99*
33	Bid/Award	45d	9/10/99	11/11/99
34	Notice to Proceed to Contractor	25d	11/12/99	12/16/99
35	STATION CONSTRUCTION	565d	12/17/99	2/15/02
36	Initial Station Construction	521d	12/17/99	12/16/01
37	*Interim Station Opening*	*0d*	*12/17/01*	*12/17/01*
38	**Complete Station Construction**	**0d**	**2/15/02**	**2/15/02**



Project: Airport Station Design Schedule
Date: 5/22/98

Task	Milestone	Rolled Up Task	Rolled Up Progress
Progress	Summary	Rolled Up Milestone	



Project: Airport Station Design Schedule Date:5/22/98	Task		Milestone	◆	Rolled Up Task		Rolled Up Progress
	Progress		Summary		Rolled Up Milestone ◇		